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SPECIAL METHODS IN THE ELEMENTARY SCHOOL

Prepared by the Committee on Special Methods:

WILLIAM S. GRAY, CLIFFORD WOODY, and FREDERICK S. BREED, *chairman*;
with the assistance of JOSEPHINE H. MACLATCHY.

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PREFACE

STRICTLY speaking, methods refer to those procedures which are followed by the teacher in order to promote the desired learning or mental development on the part of the pupil. The problem of method is contrasted with the problem of the curriculum, in which the task is to determine what the child should learn or the direction his development should take. It is also contrasted with the psychological analysis of the learning process or of mental growth. The present issue of the *Review* deals primarily with studies in method as distinguished from these other matters.

In the actual preparation of the report the line between methods and curriculum or psychology has not always been sharply drawn. This condition is partly due to the fact that methods and curriculum are sometimes in part mutually interdependent, as in the case of the activity program, and partly to the fact that we have grown accustomed to thinking in terms of subjects of instruction instead of the more abstract problems of method, and curriculum. The inclusion in this issue of a few sections on curriculum and on mental growth produces some overlapping with other issues of the *Review* in topics, but there is little overlapping in the actual content of the different issues.

Scientific studies are much more abundant in the fundamental subjects, reading, arithmetic, and spelling than in the arts, the social studies, or in natural science. As research is developed in these fields the results will be summarized in future numbers of this *Review*.

FRANK N. FREEMAN, *Chairman,*
Editorial Board, 1931-32.

CHAPTER I

Reading

PROBLEMS relating to methods of teaching reading have been studied scientifically for more than twenty-five years. A comprehensive summary of the contributions of these studies should include reference to all of them. Since this is impossible within the space allotted, the plan has been adopted of reviewing briefly at the beginning of the discussion of each problem, the conclusions reached prior to July, 1924, at which time the writer prepared a more or less complete summary of investigations relating to reading (33). The results of the studies published more recently, but prior to July, 1930, will then be summarized in more detail. In view of the fact that the psychology of reading and methods of teaching reading and literature in high schools will be discussed in other issues of the *Review*, this section is limited to the results of studies relating to methods of teaching reading in elementary schools.

Merits of Different Methods of Teaching Beginning Reading

Early studies (33:55-63) of the achievement of pupils taught by different methods showed that the use of a given "system" was not always accompanied by equally satisfactory results. The results supported the current belief that factors other than the methods used, such as the skill of the teacher and the capacity of pupils to learn, influence progress in learning to read to a large extent. Experiments involving contrasting methods, while instructive, were not conclusive in any case. A laboratory study of the progress and difficulties of pupils taught by "thought methods" and by "phonetic methods" showed that each method emphasized different phases of reading. As a result the pupils started on different routes to maturity in reading. The investigator concluded that the exclusive use of either method resulted in the neglect of habits that are cultivated by the other.

The results of more recent studies do not materially change the conclusions presented. In a study including 2,335 first-grade children in school systems using various systems of beginning reading, Seegers (61) found that "no commercial system" demonstrated marked superiority or marked inferiority. "Classes using each 'system' reported are at various levels of achievement." The explanation offered was that "each of the methods or 'systems' is partially effective." Peyton and Porter (52) reported the results of a study to determine the relative merits of the *Story Hour Method*

and an older, more formal method which gave elaborate emphasis to phonetics. Except in one instance, every comparison for two first-grade classes showed that "the reading achievement of the children who had learned by the newer and more scientific, psychological method was superior." The results for the third grade were even more favorable. The value of interesting, purposeful, informing reading activities was studied by Dickson and McLean (19) who followed the progress of a group of thirty-one children in learning to read when practice was based on reading materials growing out of an integrated activity program. The results showed satisfactory progress for the group as a whole. Unfortunately, no comparisons with other methods were made.

The value of the studies reported does not lie in any conclusion that a given method is superior to all others. It lies rather in a clear demonstration of the fact that given methods emphasize certain phases of reading more than others, and that there are factors other than method that influence progress.

Value of Systematic Method

As a protest against formal, uninteresting methods of teaching reading, some have advocated that no systematic method be used. Meriam (43), for example, compared the progress of public-school children in reading with that of children whose instruction in reading was initiated in harmony with two basic principles: "(a) The best way to teach reading is not to teach reading but to provide the occasion . . . in which certain reading functions . . . (b) Let pupils read to learn; incidentally, they will learn to read." The results were distinctly advantageous to the experimental group. Unfortunately, nothing is known of the methods employed in the control schools, the preparation and efficiency of the teachers, the capacity of the children in the two groups, and other conditions that influence progress. *What other influences?*

A much more productive study was reported by Gates, Batchelder, and Betzner (30) which relates to the value of "a modern systematic method" of teaching reading as compared with an "opportunistic method." A member of each of twenty-five pairs of first-grade pupils was taught by a systematic method which was based on a carefully organized course of study determined in advance. The other pupils were taught by a so-called "opportunistic method" in which a less definite program of studies was followed and in which more attention was given to the interests and inclinations of the pupils. Through the use of both preliminary and final tests, the progress of pupils was determined in reading, spelling, number, drawing, information gained, and social, emotional, moral, and other habits and attitudes. The results showed a distinct superiority of the systematic method in arithmetic, spelling, and silent and oral reading achievement. The opportunistic method was superior in such subjects as writing and

drawing. The evidence was not conclusive with regard to the development of interest, initiative, determination, and other personal and social traits. The authors rightly concluded that this study justifies some systematization of teaching efforts but not the "rigidly organized, highly rationalized, or logically systematized textbook" which has often completely dominated the teaching of reading.

All the evidence available justifies the conclusion that some systematic teaching of reading is desirable. Such teaching provides for the economic and orderly development of essential reading attitudes and habits. The activities provided should be very interesting, purposeful, entertaining, and informing. They should be supplemented from the beginning by much informal reading for pleasure and information during most periods of the school day.

Value of Phonetics in Teaching Reading

The early studies (33: 64-72) relating to phonetics resulted in several tentative conclusions: (a) that pupils taught by phonetic methods recognized words more accurately but often failed to develop vital concern for the content; (b) that many pupils who had received such training were unable to deal successfully with new or difficult words; (c) that some pupils learn to analyze words with little or no formal training in phonetics; (d) that the amount of training required differed with individual pupils; (e) that the value of such training was greater in some cases than in others. In general, the results showed that training in phonetics was one of many aids to accurate recognition, and that additional studies were necessary to determine the methods by which different types of pupils learn to recognize words most easily, and to determine the amount and character of the training in phonetics that is most effective.

The more recent investigations tend to reinforce the conclusions of earlier studies. Winch (71) and Mosher (47) conducted experiments in which the value of "Look and Say" methods were compared with phonetic methods in beginning reading. The results of the two studies were favorable to the use of some phonetic training. They showed that many pupils learn to recognize words rapidly during the early stages of learning to read with little or no help. Sooner or later, however, they profit from help in word recognition such as is provided by phonetic training. Some pupils need from the beginning a type of help not provided by the so-called "Look and Say" methods. Gates (28) also compared the value of phonetic and non-phonetic methods. His results showed that the non-phonetic method was in general the more effective. The study indicated, however, that some values attach to phonetics and word analysis. Instead of using one method or the other exclusively, as has been done in the past, "the intelligent procedure is to determine what phonetic devices, drills, or instructions, if any, are of value, and how and when to use them." In a

more recent summary of studies relating to phonetics, Gates (29) concluded that "certain forms of training commonly found in phonetics may possibly earn a place, though probably not without modification, in an improved program of training in beginning reading."

As suggested earlier, phonetic training is in general, but not always, more valuable some time after pupils begin learning to read. This view is supported by the results of a study by Sexton and Herron (62) which showed that the value of training in phonetics was not evident during the first five months. "It begins to be of some value during the second five months but is of greatest value in the second grade." Their study does not show when the training should begin in order to secure valuable results during the latter half of the first grade and in the second. If these findings are valid, it is possible that some investigators may have compared the achievement of pupils taught by different methods too early to secure objective evidence of the value of phonetics.

The weight of opinion of reading experts is favorable to the use of some phonetic training as shown by a study by Lohmann (40). However, opinion differs as to its exact placement in the lower grades. All writers agree that the same amount of phonetic training for all pupils is not necessary. The results of the investigations reported indicate clearly that phonetics should no longer be considered *the fundamental element* in any method of teaching reading. It is rather one of many aids to word recognition, which has definite value, particularly in the recognition of pronunciations. It should be used judiciously and emphasized among individuals according to their specific needs.

Value of Flash Cards in Improving Reading Habits

Conflicting evidence has been secured concerning the use of flash cards in improving reading habits. Gates (27) divided eight classes of pupils in grades I to IV, inclusive, into equivalent groups on the basis of reading and word recognition tests. One group was given the *Horn-Shields Flash Card Exercises* for ten minutes each day for four weeks, and the other group was given silent reading practice adapted to its level of advancement. The results showed that the groups which were trained with the flash cards excelled the reading groups "in ability to read flash cards quickly and accurately." In most of the comparisons of actual achievement in reading, the reading groups showed the greater improvement. Steiner (67), on the other hand, found that the use of the *Horn-Shields Flash Cards* for ten minutes a day for nine weeks was very valuable in increasing rate and comprehension among third-grade pupils. Unfortunately, there were no control groups. In a study with two third-grade classes, Scott (60) gave flash-card exercises containing directions or questions for two fifteen minute periods daily for twenty days. Thirty minutes was used also for oral and silent reading. A third class which received an hour of instruc-

tion daily in silent and oral reading served as a control group. The results showed distinct superiority of the training group as measured by the *Monroe* and the *Thorndike-McCall Reading Tests*. Fifty days after the close of the experiment one of the training groups was gaining more rapidly than the control group and the other was gaining less rapidly. Although the results of these studies do not agree, it may be reasonably inferred that drill on the rapid recognition of isolated phrases and sentences has limited value, as a general rule, in establishing permanent habits of fluent recognition in meaningful reading situations.

Provision for Individual and Group Needs

An early study by Theisen (33: 45-6) showed that the following methods were used widely in the elementary grades in providing for individual differences in reading: organizing pupils into small groups; using reading material adapted to individual interests and needs; varying the amount of reading practice; giving personal attention to individual needs; and providing specific types of instruction adapted to varying needs. Three types of class organization were reported in efforts to provide for the varying needs of pupils: grouping on the basis of intelligence; grouping on the basis of reading achievement; and varying instructions according to the needs of pupils in heterogeneous groups. Notable progress was made in each experimental group. The important facts brought out by these studies were (a) that grouping on the basis of either intelligence or achievement reduces only one of several variables, and (b) that no matter how classes are organized, teachers should study the achievements and needs of pupils regularly and adapt instruction constantly to individual needs.

Recent studies present conflicting evidence with respect to the value of ability grouping. Bonar (8) reported the results of an experiment involving ninety-six first-grade pupils. The results showed no advantages in segregating either bright or slow pupils. Unfortunately, no adequate description was given of the methods employed. Dvorak and Rae (23) taught one-half of a superior group of first-grade pupils in a separate class and the remainder in three mixed classes. On the basis of their findings they concluded that "when the methods and the materials of instruction are adapted to the abilities and educational needs of homogeneous groups, the results are positive." Woody (74), after analyzing the results of an elaborate study in which pupils were grouped on the basis of ability for purposes of reading instruction, pointed out rightly that the problem of the future "is not the condemnation of the practice of differentiation according to ability but the baffling and perplexing task of how to readjust the curriculum and methods of teaching so the possibilities offered by differentiation may be realized."

Significant facts concerning the value of grouping on the basis of reading achievements have also been reported. Cohler (16) grouped pupils in grades III to VIII, inclusive, on the basis of achievement and adapted instruction to the needs of each group. As a result the pupils advanced more rapidly than formerly. Shields (63) secured positive results in a controlled experiment, and Rhoads (56) found that even pupils of superior reading achievement profited from appropriate types of training. Baird (4) scheduled classes at the same hour so that pupils could attend classes of their respective levels of reading achievement. Experimental and control sections were organized. The results were in favor of not grouping according to educational age. The objections to the plan were: it was difficult to adjust the reading matter to the pupils' interests; some of the pupils felt that they had been demoted and therefore failed to cooperate effectively; and the older pupils who had to recite with the younger ones were embarrassed.

Geyer (32) reported efforts to individualize instruction through the use of the *Courtis-Smith Picture-Story Reading Lessons*. The results were distinctly favorable to the experimental groups.

The foregoing discussions show that various methods may be adopted in providing for the needs of pupils who differ in capacity and reading achievement. The results of the studies reported do not show which plan of procedure is the best. They do emphasize the fact that classifying pupils on any one basis merely reduces one variable. They also show that the need of providing for individual needs is not eliminated by any scheme of classification yet devised.

Methods of Teaching Pupils of Superior Intelligence

The methods which should be used with pupils of superior intelligence merit special consideration. Averill and Mueller (2) carried on an experiment in which the same methods were used with pupils of different levels of intelligence. The pupils who failed "to meet A. Q. predictions" were those with high I. Q's. The explanation offered was that "the teacher devoted disproportionate energy and attention to urging the duller, slower pupils forward; while those naturally brighter and keener were permitted to progress not only at a much slower rate than they were capable of maintaining, but at a rate relatively much slower than that maintained by the more meagerly endowed children." Torgerson and Shuman (69) after a detailed study of the achievement of superior pupils concluded "that pupils with high intelligence quotients have low achievement quotients if they are required to work in grades below their mental age." Both of these studies show that bright pupils often receive inadequate attention and stimulus as they are now taught.

The method of teaching bright children offers a field for productive experimentation. Saunders (59) has made a promising beginning by com-

paring the merits of enrichment versus rapid advancement for bright pupils. Sixty very bright pupils were selected from 320 sixth-grade pupils. One group was allowed to advance as rapidly as possible. The other group was given enriching materials. When the two groups were tested on the *Monroe Reading Test*, it was found that the enrichment group had made the greater gains in both rate and comprehension. The rapid-advancement group gained in time but failed to make as great gain in power to reason. Both methods, according to the investigator, have virtues.

Effect of Specific Methods and Technics on Comprehension

Various methods (33: 107-112) were reported prior to 1924 for improving comprehension of which the following are examples: using silent reading poster lessons based on experience and directions for individual seat work in the first grade; silent reading for meaning supplemented by exercises in following directions, answering questions, completing sentences, and matching cards in the first grade; motivated drills in silent reading in the third grade; providing varied training to groups of pupils in the fourth grade based on their needs; training in the fourth and sixth grades which emphasized those elements on which meaning depended, such as topic sentences, relational words, effect of different modifying phrases; training on exercises of standardized tests; training to increase meaning vocabulary, to select central thought, to organize content in logical sequence, and to reproduce the important points read; and providing teachers with numerous suggestions to be used as needed.

Studies reported since 1924 supply additional evidence of the value of specific methods and training technics. Dransfield (22) employed a "technic of teaching through standard and informal testing." Alderman (1) gave exercises to increase the understanding of vocabulary of pupils in grades IV to VIII, inclusive; organization exercises to increase ability to select central ideas, and to organize them logically; and retention exercises to improve ability to retain and to reproduce the important points read. All three types of exercises were of value, the organization exercises resulting in most gain and the vocabulary exercises in the least. Yoakum and Truby (76) gave "exercises in telling what the sentences say," "in selecting a few words which contain the main thoughts," and "in selecting the most essential sentences," which resulted in six times as much gain in comprehension and seven times as much gain in speed on the part of the experimental as the control group. Meeker (42) gave practice in answering six types of questions: "decision for or against," "cause and effect," "sense of evidence," "definition," "specific comparison," and "illustration." The results showed that such practice was far superior to undirected study of such material. Lowry (41) gave timed practice in silent reading. The significant fact about all these studies is that comprehension usually increased when specific training to that end was provided.

Merits of Different Methods of Teaching Silent Reading

Burks and Stone (13) compared the value of *Standard Lessons in Reading* and *Learn to Study Readers* in increasing silent reading achievement as measured by the *Stanford Reading Test* and the *Chapman-Cook Speed-of-Reading Test*. The results showed a slight advantage for the readers in the first tests and for the standard lessons in the second. The investigators concluded that the use of both types of training may yield better results than the exclusive use of either one. Roberts and Stone (58) compared the effectiveness of the *McCall-Crabbs Standard Lessons in Reading*, the *New Barnes Readers, Grades IV and V*, and *Stone's Silent Reading, Books IV and V*. The results were inconclusive. The features of each type of material which seemed to be most significant were the daily testing and progress record in the first, the variety of interesting types of units as to content, form, length, responses, and objectives in the second, and the interesting long stories in the third. The most significant conclusion from these studies is that different types of material contribute to progress in different phases of reading, and that the use of different procedures is often essential in promoting growth in all phases of reading.

Merits of Free or Library Reading and Instruction in Silent Reading

In 1921, Zirbes (77) divided a second-grade class into two sections of approximately equal size, pairing the pupils with respect to chronological age, mental age, and reading achievement. During a period of six weeks one group received "carefully planned, formal, and intensive instruction in reading," and the other engaged in "extensive, silent, and informal reading experience" in which the pupils chose the materials read and the teacher supervised the reading daily, giving such help and encouragement as was needed. The daily records of progress and the results of reading tests showed that the average growth in reading was almost identical for the two groups. What is more significant, however, the upper part of the group which had extensive individual silent reading showed more improvement than the upper part of the group which had formal instruction. On the other hand, the lower part of the extensive reading group did less well than the lower part of the instruction group.

White (72) compared the relative merits of library reading and class instruction as measured by the *Gates Silent Reading Tests*. The results showed that "for a period of a semester in the sixth grade the amount of instruction can be decreased without detriment provided the pupils utilize the time saved by reading under the guidance of the librarian." Field (25) compared the value of extensive individual reading and class teaching in the second, third, and fourth grades. The results, as measured by the *Haggerty* and the *Stanford Reading Tests*, indicated that the two methods were equally effective in developing reading skills. An analysis of the

other values contributed led to the conclusion that both plans should be followed. The results of such studies indicate that different procedures promote growth in different phases of reading, and that their relative value varies with the needs of the pupils taught.

Relative Efficiency of Different Reading-study Procedures

Early studies by Germane (33: 115-17) suggested that reading for specific purposes is much more effective than undirected study; that specific training in a given study procedure is very valuable; that study with specific problems in mind is more effective than undirected study or re-reading for the same period of time; and that a written paragraph summary or a corrected summary following the reading is less effective than re-reading for the same time. Such tentative conclusions suggested important problems for further investigation.

Distad (20) made a study of the performance of pupils when (a) reading was undirected, (b) reading to find the answer to eight specific questions prescribed by the experimenter, (c) reading in response to a general problem, and (d) reading to find answers to eight questions raised by the pupils as a group. The results for sixth-grade pupils were suggestive: (a) The immediate recall of the groups reading with "specific questions," "raised questions," and "a problem" exceeded that of the undirected group and was usually greater than the immediate recall of the same group when doing undirected reading; (b) the "raised questions" and "problem" procedures were slightly more effective than was the "specific question" procedure. From the study as a whole the experimenter concluded that reading with a problem or with questions in mind is valuable when definite information is desired, but not so effective when immediate recall of the entire content is desired. Wright (75) compared the value of finding answers to questions and of study guided by an outline. Although both methods were effective in motivating assignments, the results indicated that the latter was three times as effective as the former from the fifth grade upward. Piper (53) found in grades IV to VII that it was more effective to recite and then study the assignments than to study a lesson immediately before reciting. The investigator rightly questioned the validity of basing final conclusions on his results.

Such studies indicate that some reading-study procedures are more effective than others. They suggest tentative conclusions concerning the merits of certain procedures. Extensive investigation is necessary before final conclusions can be reached concerning the merits of many reading-study activities.

Methods of Improving Reading in Content Subjects

Studies of methods of improving reading in content subjects are of relatively recent origin. Gatto (31) found that the use of parallel selections

was of great value in the seventh grade in improving comprehension and retention in history. Simpson and Stearn (65) found that definite training in answering questions and in evaluating, outlining, and summarizing historical materials improved the ability of fifth-, sixth-, and seventh-grade pupils to read and study effectively. Newlun (49) found that specific training in summarizing in history, "if properly developed and used, can improve achievement in history more than ordinary study to prepare for topical or question-answer recitations." Helseth (37) encouraged seventh- and eight-grade pupils to ask questions in history as they read and to answer them according to plans worked out independently. As a result they gained remarkably during a school year in ability to locate and introduce problems, in ability to solve problems, and in conscious attention to their own methods and habits of work.

Shriner (64) demonstrated that practice in reading verbal problems in arithmetic was very effective in increasing the ability of pupils to solve arithmetic problems. Lessenger (39) found that general training in reading led to significant improvements in arithmetic. Greene (34) found that training in the reading of assigned problems for the purpose of "selecting and recognizing the process involved in the solution of each" was more valuable in developing ability to solve reasoning problems in arithmetic than training to "select the correct principle to use in solving the problem."

Methods of Increasing Rate of Silent Reading

Various methods were employed in early experiments (33: 139-47) for increasing the rate of silent reading such as speed drills with time limits; speed drills supplemented by short exposure exercises; training in rapid reading, in decreasing vocalization, and increasing the span of recognition; and rapid reading with oral recitations and paragraph reading to answer questions; and increasing the amount read. These studies showed also that rate of reading may be increased without impairing comprehension, and that the effect on comprehension varies with the amount of emphasis given to rate and to comprehension in the training exercises.

Most of the studies made recently which secured increases in rate of reading were planned to improve silent reading achievements in general. Burton (15) provided training in rapid silent reading including the following steps: arousing interest and curiosity, discussing difficult words before reading, urging pupils to increase their speed of reading and to compete with previous records, counting the number of words read in a given interval, and checking comprehension by means of questions. Quick perception exercises were given ten minutes daily in the lower grades and twice a week above the fourth grade. The results as measured by the *Monroe* and the *Thorndike-McCall Tests* were very satisfactory. It is impossible, of course, to draw conclusions concerning the specific effect of any method used on the rate of reading. Studies by Yoakum and Truby (76),

Lowry (41), and Springstead (66) combined training in rate and comprehension and secured noteworthy increases in rate of reading. Such training is in harmony with the principle that pupils should be encouraged to read only as rapidly as they can achieve specific purposes well.

Methods of Teaching Literature

The outstanding early experiment in this field was that by Hosic (33:118) who sought to determine the relative value in two sixth-grade classes of the whole-method of study and the piecemeal examination of poems. The results of the experiment showed that with one exception the pupils preferred the selections which had been taught by the whole-method. They also showed that the selections taught by this method were better understood. A second study confirmed these findings and led to the following conclusions: "A piecemeal attack on poetry with formal and ineffective reading aloud and much insistence upon the discussion of details of language, without any attempt to bring the pupil's own experience to bear on the poem as a whole and without any final synthesis, is relatively ineffective as a method of teaching. . . . Better results would be obtained by giving a vivid impression of the whole to minds awakened to the possibilities and reading to interpret in the light of experience. A second reading of the whole is probably better than painstaking examination of details, especially if these are treated as unrelated items instead of cumulative suggestions!"

Williams (70) compared the value of extensive reading versus intensive study of literature through the use of several measures of achievement. The data secured led to the conclusion that "extensive-reading methods are more effective in achieving the aims of instruction in literature than are intensive study methods." Broening (10) carried on an elaborate study among fourth-, fifth-, and sixth-grade pupils which showed that teachers can secure growth in literary appreciation through the use of appropriate methods and materials. The theory underlying the technics used was that the reading of literature should provide a satisfying experience, and should serve to stimulate, integrate, and interpret pupils' experiences. The methods employed by Hosic, Williams, and Broening are comparable in that they provide an enjoyable experience and vivid impressions of the meaning of selections as wholes.

Methods of Influencing Reading Interests

Two significant facts were revealed by the early studies of children's interests. One was that the book which the teacher most preferred and was enthusiastic about was usually selected by pupils. The second was that the amount of reading is increased and the standards of selection raised by having pupils make a comparative study of books for their own use and develop a set of standards which will guide them in selecting

books. Although many studies have been made recently concerning the nature of children's interests in reading, few have reported the results of studies to determine the merits of specific methods of stimulating interests and elevating tastes. Several studies, of which Rasche's (55) is an example, have listed methods reported by teachers. Rasche's study showed that much more time is being devoted to stimulating interests than to increasing reading tastes. Experience teaches that it is far easier to induce children to read than to develop tastes for good reading.

Methods Employed in Campaigns To Improve Reading Instruction

Two state-wide or regional efforts to improve instruction in reading have been reported. Simpson and Stern (65) reported the following steps: a preliminary program of testing to determine the achievements and needs of pupils in various counties; conferences with teachers concerning the results; group study of the teaching problems suggested by the test results; the preparation and distribution to teachers of bulletins of standards and suggestions, preparation of work materials for pupils; check testing; preparation and publication of supervisory reports based on the campaign. In 1928-29 the State of Oklahoma (24) was divided into six districts by the Director of Rural Education. With the assistance of the Rural School Supervisor of Northeastern Teachers College, a testing and remedial program was carried on. The unique steps taken included the extensive use of bulletins, and circular and personal letters. Both studies showed clearly the value of revealing to teachers their problems, of encouraging extensive studies of teaching problems, of giving assistance and guidance in securing reading and test materials, and of providing practice in diagnosing pupil difficulties.

Four studies (14, 36, 45, 54) were made in rural and village units which led to the following tentative conclusions: well-planned programs for the improvement of reading are usually successful; general suggestions are not as effective as simple, concrete information applied to specific situations; concentration for a period on reading has favorable results on achievement in other subjects; and an important step in such programs is to help teachers to recognize the difference between good and poor teaching procedures.

Campaigns carried on in six cities (5, 9, 11, 12, 48, 66) emphasize the value of the following procedures: building up a sound understanding of the nature of reading which will enable teachers to evaluate their own and proposed methods of teaching; developing confidence by supplying teachers with essential materials and constructive suggestions; cultivating a critical attitude on the part of teachers through the use of objective studies of the progress and needs of pupils; shifting emphasis in teaching to phases of instruction requiring attention; setting up high standards with respect to assignments and teaching procedures; encouraging teachers to

direct pupils in reading activities in content subjects; and encouraging wide provision for independent reading.

Methods Used in Remedial Cases

Two divergent trends were apparent in the early reports (33:204-8) on remedial cases. The first was toward the use of a specific device in all cases belonging to the same type. For example, Schmitt made excellent use of phonetics in the case of pupils encountering unusual difficulty in learning to read. Fernald and Heller used the method of tracing and writing words in teaching non-readers. Hinshelwood reported good results through the use of the alphabetic method in cases of wordblindness. Hollingworth justly pointed out that other methods might have been used in each of these studies. "In fact, no investigator has established his or her method as the only method of successful approach to particular cases by excluding other methods through experimental teaching." The second tendency was to vary the methods according to the interests, needs, and aptitudes of poor readers. The latter plan has been followed largely during recent years.

One of the significant contributions of the studies since 1924 is a clear demonstration of the value of intelligent provision for the needs of poor readers in public schools. Morrison (46) provided remedial instruction to pupils in the St. Louis schools grouped according to the needs. The methods employed in each group were adapted constantly to individual needs. Beeby (6) also found that such a procedure was very valuable in the Chicago schools. Otto (51) gave six over-age fourth-grade pupils intensive training in work-type reading and secured very satisfactory progress. Griffin (35) demonstrated that the reclassification of pupils into homogeneous groups with respect to reading achievement and the provision of instruction adapted to the needs of each group were very effective in overcoming deficiencies. The statement should be added that group instruction proves more effective in the case of pupils who suffer from moderate rather than gross deficiencies in reading. Baer (3) described the methods and results of several case studies in reading made in Cuyahoga County, Ohio, which demonstrate clearly the possibilities and value of such work as a part of the routine of teaching. The methods used differed little from those employed regularly by good teachers. They were applied, however, after the needs of the pupils had been carefully diagnosed and were clearly understood.

Laboratory and clinical studies of poor readers have been reported by Blanchard (7), Collins and Phillips (17), Dougherty (21), Ford (26), Monroe (44), Orton (50), Rigby (57), Witmer and Ambler (73). Although few of these cases were studied under school conditions, the information secured and the methods developed were very helpful in securing an understanding of many of the poor readers found in classrooms.

The problem of the non-reader has been considered at length. Keller (38) made use of writing according to prescribed rules as a means of developing word perception. Dearborn (18) attributed the difficulties of non-readers to two conditions: reversals in the forms of certain letters and words or parts of words; alternations in the correct sequence of letters or in the outline of word forms and the substitution of incorrect elements in reading and writing. He prescribed the tracing method for pupils in the first two grades and the letter and phonic method for more mature pupils. Stone (68) also reported the case of a non-reader in which writing and spelling were often used "to develop an ability to perceive the characteristics of words and remember their visual images."

Concluding Statement

The foregoing report shows that investigations relating to reading have made many notable contributions to methods of teaching reading. Perhaps their greatest contribution is a clearer knowledge of the problems that should be studied. We have scarcely crossed the frontier in this field. The next decade should witness much wider use of scientific procedures in the study of problems relating to methods of teaching reading.

CHAPTER II

Arithmetic, Language, Fine Arts, Physical and Health Education, and Industrial Arts

ARITHMETIC

THE present summary involves a brief report on investigations published within the last three years and dealing directly with special methods of the teaching of arithmetic. Since such excellent summaries of these experimental studies have been presented in Buswell and Judd's *Summary of the Educational Investigations in Arithmetic* (87), Buswell's supplements appearing annually in the *Elementary School Journal* (88), the *Third and Fourth Yearbooks of the Department of Superintendence* (115, 116), and the *Twenty-Ninth Yearbook of the National Society for the Study of Education* (117), no effort has been made to review the investigations which were published previous to 1927. This summary, while based upon an intensive survey of the materials available in the libraries of the University of Michigan and Michigan State Normal College, does not contain in all probability all of the investigations which should be included. No definite canvass of institutions of higher learning or of bureaus of research within city school systems for unpublished investigations was made.

Methods of Drill

While many of the investigations deal directly or indirectly with the topic of drill, attention will be given to but seven of them under this heading. Knight (105) in discussing the value of properly distributed drill presented data from an investigation by Lutes emphasizing the necessity of properly building drill exercises. The study involves 600 pupils in grade V and proved that scientifically distributed drill in each of the four fundamental processes was from 18 to 24 percent more effective than drill constructed in a more or less haphazard fashion. Repp (128) in an investigation involving 613 pupils in twenty-four different classes has shown that best results are achieved from drill exercise materials in which the four fundamental operations are mixed. Wilker (143) in her investigation involving the evoking of responses to principles in percentage found that varied materials and statements of problems produced better results than non-varied materials and similar statements of problems. It is significant that both Repp's and Wilker's investigations revealed that drill involving exercises causing the mind of the learner to shift continually from one type

of exercise to another, produced greater improvement from a given period of training than drill on exercises requiring relatively few mental shifts. Myers and Myers (114) in their attempt to determine the nature and frequency of errors in one hundred simple combinations arranged so as to cause a maximum and minimum of mental shifting, found that greater time expenditure and less accuracy resulted from exercises involving constant mental shifting. This investigation, however, does not represent results obtained from an extended period of training.

The effect of the pupil's attitude toward drill is reflected in Panlasigui and Knight's (126) attempt to determine the difference in the gain made by pupils in grade IV who know their successes and failures on a series of exercises involving the fundamental operations and by those not made aware of the nature of their achievement. The former group of pupils, especially those who succeeded, made significantly greater gains, and the use of the pupil's progress record seems justified. Myers (112) indicated that speed pressure has a very detrimental effect when applied in securing responses of children to number combinations which have been previously mastered. Myers and Myers (113) indicated that drill in simple number learning, which involves the mere reading of correct responses to given exercises, is more effective than that which involves the detection and correction of errors.

Permanence of Learning

Four different investigations were reported on the influence of the summer vacation on the achievements of pupils. Brueckner (81) found from the results of three examinations on the basic facts in addition and subtraction to pupils in grades IIB and IIA that there was practically no decrease in achievement in the addition facts, but that there was considerable decrease in the subtraction facts. Bruene (84) found that the children in grades IV, V, and VI of the training school of the University of California at Los Angeles lost as a result of the summer vacation an amount on arithmetical computation as measured by the *Stanford Achievement Test in Arithmetic* usually requiring six months to attain. There was but a negligible loss in arithmetical reasoning. An investigation by Dix (93) showed that of 150 children in grade V, tested in September, 70 percent had lost one or more points from June to September; 9 percent had neither gained nor lost; and 20 percent had gained. An October testing showed that 41 percent of the entire group had gained, but that 40 percent had not yet attained their June level of achievement. Nelson (119), in giving a series of tests the first week in September and at intervals of every two weeks thereafter until a period of six weeks had elapsed, found that the pupils in grade VIIB regained their spring level of achievement in speed exercises involving the fundamental operations about four weeks after the opening of school; and in the number of exercises correctly solved, about

six weeks. The pupils in grade VA, however, had not gained their spring level in either type of exercise at the end of the six-weeks period. These four studies point to conclusions that are in keeping with those resulting from previous investigations, but still more investigations are needed before the exact influences of the summer vacation are known.

Problem Solving

Several investigations attempting to throw light on the difficulties encountered in the solution of verbal problems in arithmetic have been reported. Monroe (111) concluded from the results obtained from the giving of four sets of tests that in general the responses are conditioned by habit and not reason. Washburne and Morphett (139) concluded from their investigation, in which they gave a series of problems expressed in familiar and unfamiliar settings to 441 children in grade V, that a much higher percentage of the pupils attacked and solved correctly the problems involving child-like and familiar settings. Wheat (141), who was chiefly concerned with the materials for problem-solving for grade IV, found little difference between completely stated imaginative situations and formal statements of abstract problems so far as the pupils' responses are concerned. Mitchell (110) found a correlation of .52 between the responses to verbal problems with numbers and verbal problems without numbers and concluded that because a pupil can solve a specific problem does not mean that he has formed a generalization which he can apply to all other similar problems.

Hydle and Clapp (101), in an investigation designed to study the effect of eight elements of difficulty on the interpretation of concrete problems, found that if the problem could be visualized it became almost as easy as if it occurred within the child's experience. Bowman (80) found a correlation of .56 between pupils' preference for problems and their ability to solve them.

John (103) found that most of the errors in reasoning made in grades IV, V, and VI are in the fundamental operations and in reading. Lazerte (108) concluded that when intelligence was held constant, experience and training were the important factors in the successful solution of verbal problems. Washburne (137), in his attempt to find whether children acquire ability to apply the fundamental processes in arithmetic to verbal problems if the processes are learned directly in the solution of the problems or learned in abstract fashion and later applied to problem situations, concluded that the children learned equally well under each type of training.

Stone (135) reported an interesting investigation made with 175 pairs of matched pupils in which he found that in reasoning ability those pupils using specially designed practice exercises made significantly greater gains than those not using such exercises, and that the increased ability obtained

through the use of such exercises transferred to the solution of problems dissimilar to those in the practice exercises.

Dower (94) reported that remedial practice for fifteen minutes a day for twenty days and for fifteen minutes three days per week for a period of weeks resulted in considerable gain for most pupils.

Diagnostic and Remedial Instruction

Benz, Clemens, Craig, Guiler, Lazar, O'Brien, Otto, and Stegman (79, 90, 92, 99, 107, 121, 124, 133, 134) reported investigations concerned with the diagnosis of difficulties in the solution of exercises in the fundamental operations. The results obtained after a period in which remedial instruction was stressed showed rather outstanding gains, and as a rule the practice of attempting to determine the cause of the inability to respond correctly to the exercises and of building remedial exercises designed for overcoming specific difficulties seemed warranted.

Investigations by Gabbert, Evans, Trousdale, Whitson, Soth, Chase, and Neal and Foster (98, 96, 136, 142, 132, 89, 118) reported the use of the case study technic in connection with diagnostic and remedial instruction, centering around the individual child rather than around a group of children. As a rule, the results of these intensive diagnoses and remedial programs showed that the pupil had made material gains after a period of intensive practice.

Individualized Instruction

One outgrowth of the use of standardized tests, as indicated by the investigations involving diagnostic and remedial instruction, has been the reduction of instruction more and more toward an individual basis. Four investigations were reported which compare the results obtained from classes using individualized instruction in arithmetic and from those using the traditional procedure. Hamilton (100) reported an investigation carried on in a class of sixteen pupils in which no group recitations were held and in which the class period was used for conferences and work. On the basis of tests given at the beginning and end of the investigation it was found that these pupils made more than twice the progress which normal pupils are supposed to make. McDade (109) described a special device by which he individualized the drill for children in grade II in learning the number combinations. Sheerin (131) reported that the Dalton technic, when applied to pupils in grades VIA, VA, and IIIA, increased the children's interest and self-reliance in arithmetic. Russell and Long (130) found that a modified form of individualized instruction in arithmetic in grade VII was superior to the ordinary group instruction.

The results of these investigations must not be interpreted to mean that all instruction in arithmetic should be individualized. The superior gain made in classes having individualized instruction may be the result of a

greater interest caused by participation in the investigation. However, the studies reported should be suggestive of other studies which may be made.

Study of Errors

The rather extensive literature dealing with the analysis of errors in arithmetic was augmented by five studies. Waterson and Unruh's (140) study dealt with errors in the addition combinations. They found that the percentage of errors was highest in those exercises involving the zero combinations, and that nearly 50 percent of the errors were made by pupils whose mental ages were below the first quartile. Brueckner (82) made an analysis of 21,065 errors made by the pupils in grades VA, VIB, and VIA in solving exercises involving the fundamental processes in fractions. Kee (104) carried on a less intensive investigation in a similar attempt to find the most common errors in fractions. Brueckner (83) made a further study of the errors made by pupils in the reading and writing of decimals, in the converting of decimals into other forms, in the general comprehension of the values of decimals, and in the ability to employ the four fundamentals in connection with decimal fractions. Edwards (95) made an analysis of errors in the solution of exercises in percentages and found many of the errors consisted in giving answers which were clearly impossible; many of these could be traced to the tendency of pupils when confronted with a difficult situation to substitute the process involved in a simpler situation. Another investigation, showing that failure to comprehend the meaning is one of the great sources of difficulty which children encounter in the solution of their exercises, was that of Renwick (127).

Fundamental Operations

Three investigations were reported involving the old question of the difficulty of the combinations. Knight and Behrens (106) working with pupils in grade II attempted to find the difficulty of the number combinations by ascertaining the amount of time for making responses and the number of repetitions necessary for permanent mastery of the combinations in addition and subtraction. Their findings gave quite different indices of difficulty from those found in other investigations. Washburne and Vogel (138), in an investigation, in which they varied the order of presenting the so-called easy and difficult combinations, found that the order of presenting the combinations influenced greatly their intrinsic difficulty. Fowlkes (97), in an investigation in which he attempted to determine the difficulty of the 100 combinations in multiplication, found indices of difficulty different from those given in Clapp's investigation previously mentioned. Norem and Knight (120) also experimented with the difficulty of learning the 100 combinations in multiplication, and likewise reported different indices of difficulty from those of Clapp.

Buckingham (86) presented data gathered from grades II and III in seven different population centers to show that pupils who add downward are more efficient than those who add upward. His investigation is probably as extensive as any carried on on the topic, but the results are not in agreement with those found previously. Buckingham (85) reported two investigations on the method of subtraction and concluded that addition and subtraction facts should be taught together, but that the "take-away" method of subtraction should be used in preference to the additive method. Osburn (123) in his investigation on the best method of subtraction concluded that the "equals-additions" method is superior to other methods. Ruch and Mead (129) after reviewing the studies dealing with methods of subtraction, suggested that the question is still open and that the final answer must be obtained through more extensive investigations.

Colwell (91) in making a plea for better gradation of material in division suggested that the material be divided into two types: (a) with apparent quotient figures; and (b) with non-apparent quotient figures. John (102) after experimenting with two groups of pupils in grade V in the elementary school of the University of Chicago reached a tentative conclusion that it is better to teach children to divide by using the method of long division rather than the method of short division.

Transfer of Training

Three studies of significance on the question of training were made by Beito and Brueckner (78) in their investigation to determine to what extent the teaching of the fundamental combinations in direct order transfers to the reverse order of those combinations. They stated that bonds formed in learning the direct form of an addition combination carried over almost completely to the reverse form and that the amount of carry-over was influenced very little by the method of presentation. Olander's (122) results substantiated these conclusions.

Overman (125) studied, by means of 112 pairs of matched pupils, the effects of instruction on three types of examples of two-place addition on the pupil's ability to handle closely related types in two- and three-place addition and subtraction and to determine the effect of method of instruction on the amount of transfer. Results indicated that the effect of instruction and practice on certain types of examples was not confined to those types but spread in considerable amounts to other related types of examples, and that the amounts of such transfer can be greatly increased if the specific types are taught in such a way as to help pupils to generalize the process.

The results of these three investigations are very important in that they serve as a sort of antidote to that over-worked doctrine of specific training and suggest that if proper methods of teaching are employed it may be possible to reduce the amount of subjectmatter in the different grades.

LANGUAGE

The present summary is limited to those experimental studies published within the last three years dealing with various aspects of special method in the teaching of language. Investigations written previous to 1929 are so well summarized in Lyman's *Summary of Investigations Relating to Grammar, Language, and Composition* (157) that it seems needless to include those that appeared before 1927. In-so-far as possible, the studies reported have been confined to grades below grade VI, but at times higher grades have been included, due to the fact that the findings and conclusions have made significant contributions which should affect special methods in the lower grades.

Language Habits of Young Children

Zyve (174) made a study of the conversation of pupils in grade III in the training school of the San Jose State Teachers College. Waring (171) sought to discover the tendency of language approval versus non-language approval as a factor in the improvement of simple discriminative responses of children from two to four years of age. On the basis of her data she concluded that the language response facilitates learning, tends to make the learning more permanent, and causes it to transfer to other responses. Rugg, Krueger, and Sondergaard (166) made an effort to study child personality through the language of the pupils in the kindergarten. They suggested that the results show that the child in the kindergarten is primarily a defender of his own individuality and relatively an unsocial individual.

Piaget (163), investigating the language and thought of the child, made verbatim records of all remarks of two children of six and one-half years of age attending the Maison des Petits de Institut Rousseau. He also took twenty children from four to seven years of age in this school and obtained records of their group conversation. On the basis of results, he concluded that ego-centric language, together with lack of coherence and system in thinking, seems to predominate in children of the ages studied, and that children do not understand each other till the age of seven. This series of studies constitutes a very important contribution to the study of language and its relationships, and the technic employed has had a rather widespread influence on subsequent experimentation.

McCarthy (159) analyzed the development of language as it occurred in fifty consecutive verbal responses made by 140 children varying in age from eighteen to fifty-four months. She made a further study (158) of children's language in different situations and of character traits as measured by the *Marston Rating Scale*. Results show low correlations between length of response and extroversion and for the different situations and ego-centric responses. The most marked tendencies in relation to extroversion were the negative correlations of these ratings with emotionally toned responses.

Hetzer, Hildegard, and Reindorf (154), comparing the language development of sixty-five infants whose parents belonged to the laboring class with a group of eight children whose parents belonged to the professional class, decided from the conversations recorded that there is little difference in the behavior of both classes when utterances are purely instinctive, but that in other verbal cries the children of the laboring class are very greatly retarded. Jenkins (155), comparing the differences in the oral language of the A and B sections of grade II, suggested that the social oral language stage is not always attained by the age of eight and that language ability does not seem to depend upon desire for expression of sentence form.

Many of these studies dealing with the development of language in young children have only a remote relationship to special methods of teaching language, yet it is obvious that such teaching will be modified more and more as the results of such studies become known. With the great emphasis now placed on pre-primary education, the number of such investigations will increase.

Diagnostic and Remedial Instruction

Within the past decade many investigations have been made compiling the errors made in oral and written speech. These studies have become so common that few of them are now published as research. Baker (145), in an attempt to determine whether the errors commonly made in the South are identical with those made in other sections of the country, reported the most common errors to be the use of the present for the past tense and the lack of agreement in number of the subject and predicate. Turney and Ummel (170) by analyzing the compositions of 348 junior high-school pupils found that 56 percent of all errors included faulty connectives, obscure reference of pronouns, and confusion of form from similarity of sound and meaning.

Wilson (172), from attempts at remedial instruction in written English, concluded that improvement results when the teacher giving remedial instruction has each child note his specific errors both in oral and written form and then directs his attention to the correction of his own errors. Guiler (152) reported an investigation involving diagnostic and remedial instruction for overcoming errors in capitalization. He further reported (153) a similar study for improving the ability to punctuate. The investigations of Wilson and Guiler, as presented, suggested that errors in English can be eliminated if the instruction is adjusted to the needs of the pupils.

Leonard (156) reported the superiority of the experimental group in a study in which he attempted to determine whether the use of practice exercises in the nature of proof-reading, error correction, and dictation would improve the pupil's ability to write compositions free from error. Cole (148), from the results of a program of remedial instruction in Lincoln High School, Cleveland, Ohio, concluded that unity of purpose results from

the use of uniform tests and that pupils are more sensitive to certain types of grammatical error. Wiswall (173) furnished evidence that sentence structure can be improved by properly constructed practice exercises involving proof-reading and recognition drill for detecting run-on sentences. Miller (160) proclaimed the value of remedial work through the results of a grammar tournament.

The general conclusion from all of these studies on diagnostic and remedial instruction is that remedial practice based upon a careful diagnosis of the pupils' difficulties will eliminate mechanical errors in English.

Methods of Instruction

Under this caption a number of studies will be reported which stress some variation in teaching procedure. Some of the studies are closely related to those described in the previous section, but the difference in emphasis will become apparent. O'Rourke (162) set up an investigation to determine the effects of the use of self-aids in the learning of English and contended that the use of the self-instruction and self-correction material motivates work and stimulates the pupil to accept responsibility. Bennett (146) found that discussion and long group recitations are not necessary to bring a group of children up to the standard for their particular grade. Garbe (151) found that gains in both fluency and accuracy of expression resulted from an attempt to correlate English composition with the content subjects.

Materials of Instruction

Camenisch (149) analyzed twenty-four courses of instruction in order to locate what she labelled the "essentials" of English. Thorndike, Evans, Kennon, and Newcomb (169) made an adequate and accurate list of English constructions by adding to the list given by *Poutsma's Grammar of Late Modern English* additional constructions found in forty-five selections from English literature. On the basis of frequency of occurrence the investigators made an approximate estimate of the importance of each of the 438 constructions in the final list. The detailed results of this investigation will constitute a fundamental part of the work of the Essentials Committee of the National Council of Teachers of English. Dawson (150), from an analysis of five language-composition texts for grade VII, which were made to ascertain to what extent the books included progressive tendencies and to what extent they realize the objectives in upper grade teaching of English, indicated that her analysis shows a shift in emphasis toward an increased stress on the teaching of grammar and less stress on the writing of composition.

Baker (144) made a study to determine the uses which children have for language outside of school. It is suggested that the importance of this

study lies in designating the situations which can be utilized in adjusting instruction in English to the needs of the pupils. A study somewhat similar in nature is that of Neal (161) in adapting the curriculum to non-English speaking children in the San Antonio public schools.

All of these investigations involving the materials of instruction are very simple and hardly present sufficient data to warrant the many assertions made; but nevertheless they illustrate efforts on the part of teachers of English to study in a somewhat scientific manner the selection of the elements of the subjectmatter involved in their teaching.

Development of Language Ability

Symonds and Lee (167) made two studies to determine how children learn to punctuate and use capital letters as they progress through school. From the findings of these investigations they suggested facts that should be helpful to teachers in determining which items should be stressed in the different grades. Potter and Touton (165) were interested in a similar problem in which they attempted to determine how many of the pupils enrolled in the junior and senior high schools were able to make correct use of the several tools of English in written composition.

Betzner (147) attempted to find something of the form and content of original compositions dictated by children of from five to eight years of age. In commenting on her findings she concluded that current textbooks in English devote more attention to the reproduction of ideas and patterns of others than to guidance in the handling of original themes and self-chosen patterns.

Poley (164), in attempting an investigation to find the relation between variety of sentence structure and technical excellence in composition as a whole and its relation to general mental capacity, found from data collected a coefficient of correlation of .30 between variety of sentence structure and mental capacity, and .70 between variety of sentence structure and general excellence of the composition as measured by an expert teacher. This investigation has most significance in suggesting a fruitful field for further investigation.

The studies comprising this section of the report are very significant in that they represent efforts to analyze the different factors involved in growth in the use of language and in the natural interests of the pupils in the use of language. In the past, much of the research has concerned itself with the mere tabulation of mechanical errors and with the application of remedial instruction for overcoming these errors. The studies in this section seem to give promise of the day when the more subtle aspects of the teaching of language will be studied as intensively as the more mechanical aspects.

Development of Ability

A few investigations bearing upon various aspects of the development of ability in art have been published, although the investigations are not closely related. Knauber (180), in attempting to ascertain the nature of art ability in very young children by asking them to draw pictures of whatever might interest them, found a great variety of pictures conditioned by whatever proved new and interesting in the environment without regard for distinct patterns. She added that the proportion of young children possessing talent in art is not more than one in thirteen. Schereschewsky (188) reported that while age is a very important factor in the comprehension of pictures, the intrinsic nature of the picture itself, regardless of the amount of detail involved, determined in many instances the possibilities of comprehension. Lehman (181), through having children check the activities in which they have voluntarily engaged during a previous week, found that children of the younger ages draw more with pencil and crayon than older children, but that older children tend to devote more and more of their free time to other types of activity. Miller and White and Johnson (191) reported studies involving children's choices of pictures. The pupils involved in the first study, after a certain time had been devoted to the study of pictures, developed a real interest in pictures and showed much progress in the appreciation of them. The pupils in the second study showed, without definite instruction, very great agreement in the selection of the best-liked pictures but failed to make discrimination among other pictures under consideration. Dallinger (176) found that the drawings of a child are modified somewhat in keeping with the consciousness of his own physical development. Rice (187), in attempting to determine choices of the kinds and direction of strokes made by young children in copying plane figures, found that the age of the child and position of the figure to be drawn greatly influenced the nature of the movements made, and that with increase in age there was a tendency to shift from the continuous-line type of drawing to the broken-line type. In another study Rice (187) reported that a higher correlation exists between imitative drawing and perceptual development than between imitative drawing and motor development, and that a very high correlation exists between scores on perception and scores on motor control. Gantschewa (179) concluded from an experiment with the plastic constructions of children that in the earlier stages they tend to grasp objects in a unified manner, although he did find some indications of specific affective experiences leading to what he termed a distinctly "membered" model. Drought (177), in determining the in-

¹ The task of selecting the investigations to be included in the remaining sections of the report was very difficult. In the first place there were almost no studies in which method of teaching *per se* was the variable. In the second place, the studies being only remotely related to the general theme under consideration were under widely divergent topics which almost defied classification. For this reason, the scope of the studies hereinafter reported is somewhat wider than in the other sections.

fluence of unity, harmony, and proportion in the appreciation of sketches in art, found that the three factors ranging in order of their greatest influence were harmony, proportion, and unity.

Measurement and Related Studies

Three studies describing efforts to develop instruments for measuring achievement in art will be mentioned. Meier (184), in a test of esthetic sensitivity, set the task of determining the better of two pictures in a large number of pairs, one of which is an exact reproduction of a picture of recognized merit and the other a modification of the original picture. McAdory (183) constructed a test for art appreciation consisting of judgments concerning sixty specimens of art selected from current art magazines, trade magazines, art museums, or books on special subjects. Todd (190) described the use of an informal testing technic, in which children were given three minutes for drawing each of eight different pictures; then after definite periods of practice on the difficulties manifested, the test was repeated and the improvement noted.

Lewerenz (182), in studying the relationship between the intelligence quotient and ability in art, concluded that anyone succeeding well in art will succeed on an intelligence test, but that success on an intelligence test does not necessarily mean success in art. Speer (189) obtained low coefficients of correlation between scores obtained on tests for appreciation in poetry, prose, and art. Brooks (175) discovered that the scoring of drawings can be done much more accurately by the use of scales, especially the *Thorndike Drawing Scale*. Goodenough (178) reported a study conducted to measure the intellectual factors involved in the spontaneous drawings of young children.

PHYSICAL AND HEALTH EDUCATION

Methods of Teaching

Wood and Cassidy (221) concluded, from a study of the "new physical education" in which the students conduct their own classes under the guidance of a director, that there had been a development of responsibility, initiative, cooperation, and desirable health habits. Evans (198), in an effort to correct the posture of children in grades IIIB to XIIB by establishing in the mind of the child a proper attitude and interest, found an improvement of 16 percent after the third semester of instruction. Coulter and Johnstone (196), studying the methods of teaching physical education to children in grades V and VI, found that by dividing the classes into teams and keeping charts of health habits, interest and morale were increased and leadership was developed.

The investigation by Berkshire (193) on the method of teaching hygiene to children showed that improvements were made when a list of good health habits to be established and bad habits to be broken was kept. East-

wood (197) found from data on methods in health instruction gathered from 107 grades that seventy-eight grades used a definite program involving projects that encouraged health practices. Payne and Gebhart (211) found, at the end of a year of instruction in health education, marked improvement in the diet and sleeping hours of the children. Field and Stennis (200) reported an investigation involving nine classes of underweight children. Through practical and simple instruction regarding food, sleep, and play, the children gained in weight and improved their general health habits. A health program carried on during the school year with 10,000 children was reported by Allis (192); in May, 75 percent of the children had acquired 100 percent health. Faber (199) reported a similar health program with 1241 children. Improvement was slight, except in the strictly medical work where much progress was made in the detection and correction of handicaps.

A study by Gordy (203) covering seven years of dental-hygiene service showed an increase of 91 percent in the number of children holding perfect teeth records. Fones (201), in an investigation for the improvement of the health hygiene of 20,000 children, found that over a period of ten years the average number of cavities was reduced one half and the school retardation was reduced 22 percent. Schweg (217) and Hardy (204) reported health projects with children when divided into control and experimental groups. After a program of remedial instruction had been given to the experimental group, the results of testing showed that this group had made greater progress than the control group. Pollack (212) undertook a program to correct certain foot deformities and found an improvement of 19 percent after seven weeks. The United States Public Health Service (219) reported three studies involving physical development and posture. The first study showed that special exercises increased the height of the child; the second study, that boys grew more rapidly during adolescence and puberty; the third study, that as height and weight increased, strength increased also, with its greatest rise during adolescence. Rogers (213), in studying a twelve-year program of corrective exercises carried on in one of the public schools, found that from grades I to XII, one-half of one percent of the children each year improved from B to A in posture rating, and two percent dropped to C and D rating. After studying the postural relations of 2,200 boys and men, Schwartz, Britten, and Thompson (216) found a relation between age and posture, but no relation between posture and the type of build of the individual as judged by the height, weight, and abdominal circumference. Kempf, Jarman, and Collins (209) examined school children to determine the number of refractive errors in vision. Their results emphasized the necessity for regular annual examination of the eyes.

Rogers (214) reported an investigation summarizing the literature involving the physical defects of children in the schools of a number of

American cities. Chayer (194) found that 5.7 percent of the 10,000 children in 51 schools had hearing defects. A study by Sterling and Bell (218) of the hearing of 710 children showed that the highest percentage of children with significant hearing loss was found in the group with the lowest I.Q. and in the overage-for-grade group. Kaiser (207) found, from studying the tonsil and adenoid infections of 2,200 children, that their removal influenced favorably colds in the head, sore throat, cervical adenitis, and rheumatic diseases, and unfavorably bronchitis, pneumonia, and sinusitis.

Measurement and Related Studies

Monahan and Hollingworth (210) in an investigation concerned with the neuro-muscular capacity of children who test above 135 I.Q. found that these children as a group were above the control group of ordinary children in neuro-muscular activity. In a study by Kempf and Collins (208) of the relation between the mental and physical status of 5,000 children, it was shown that the I.Q. was definitely influenced by the environment, and that the average number of physical defects decreased as the I.Q. increased. In an investigation by Westenberger (220) to determine the extent to which physical handicaps influence the achievement and intelligence of children, it was found that a correction of ordinary physical handicaps was not always accompanied by improvement in intelligence and scholarship. In Hoefer and Hardy's (205) study of the influence of improvement in physical condition on intelligence and educational achievement, there was a consistent tendency for the children in better physical condition to have higher ratings in intelligence and achievement. Schools (215), in testing the motor ability of 7000 boys and girls, found a wide range with most of the children either over- or under-developed. Jenkins (206) made a study of the motor achievement of children of five, six, and seven years of age. The results showed that there was less marked sex difference in seven-year old children than in younger children. Collins (195) reported a study of the physical measurements of children of native white race stock. He found that girls mature one to two years earlier than boys, and that in all measurements taken, except vital capacity and transverse chest diameter, the mean measurement for girls exceeded that for boys by the greatest amount at the age of thirteen. Franzen (202), in an analysis of data to derive measures of the growth and nutrition of children, showed that height did not correlate with weight, and that many other skeletal combinations were necessary for the prediction of weight.

INDUSTRIAL ARTS

Methods of Teaching

Smith (232) studied a school conducted on a Smith-Hughes basis and another on a non-Smith-Hughes basis. He concluded that industrial schools in large cities could use the Smith-Hughes Plan, but that in small cities

strong manual arts courses on a non-Smith-Hughes basis are more commonly applicable. An investigation was made by Anderson (223) to determine the best curriculum and the transfer of training in five industrial arts courses. Results showed that there was little transfer and the most favored shop curriculum placed the subjects in the following order: printing, woodwork, sheet metal, electricity, and mechanical drawing. Wallace (233) studied the operation of the work-study-play system and found that it eliminated the expense of vocational schools. The National Industrial Conference Board Inc., (229) in a study of the subnormal boys in the public schools of New York City, found that these boys had been assembled into one building where half-time was devoted to suitable shopwork and half to the classroom work. Megow (227) in conducting an investigation in grade VI of his industrial arts classes discovered a high correlation between mechanical drawing and woodworking as taught by the contract method. Bauder (225) reported that Philadelphia's program of industrial education was considered an integral part of a unified program covering twelve grades, beginning with simple handwork experiences and graduating to the study of great industries.

Measurement and Related Studies

Paterson, Elliott, Anderson, Toops, and Heidbreder (230) devised a test for mechanical ability known as the *Minnesota Mechanical Abilities Test*. The test has four sections: spatial relations test; paper formboard test; assembly test; and interest analysis test. Anderson (222) in making a study of the reliability of the *Minnesota Test* found that 50 percent of the cases were located exactly and only 5 percent were two positions away.

Sell (231), in an effort to determine the relationship of the development of mechanical ability to chronological age, concluded that the development of mechanical ability is dependent to a great extent on the chronological age of the subject. Anderson (224) found that there was no significant relation between environmental factors and mechanical ability. Mythaler (228) in a study with boys of grade VII found a correlation of .51 between academic work and woodwork. Kiefer (226) made two experiments in an attempt to find out whether superior children have correspondingly greater mechanical ability. From performance on manual motor tests she concluded that any differences are negligible.

CHAPTER III

Spelling, Handwriting, Social Studies, Character Education, Geography and Natural Science

THIS review of literature in the subjects mentioned in the title is confined for the most part to objective studies that have appeared in the United States within the years 1928, 1929, and 1930. In a few instances contributions of a theoretical nature have been included because of their interpretative value, and earlier studies have been referred to in order to make connection with the past.

SPELLING

The studies in the field of spelling will be discussed under the following general headings: (a) derivation and gradation of the vocabulary, (b) methods of instruction, (c) generalization of ability, (d) diagnosis and treatment of disability, and (e) measurement of achievement.

Derivation and Gradation of the Vocabulary

Recent work on vocabulary problems deals with the relative emphasis to be placed on the usage of children and that of adults, the derivation of more reliable vocabularies of children's letters and themes, the use of the association method to derive the vocabulary of children, and the comparative study of gradation principles.

Social utility and word selection—Modern educators may claim credit for being the first to use objective methods in applying the principle of social utility in word selection, but they were not the first to conceive and use the principle. Good (266) reported that Richard Mulcaster, a famous Elizabethan schoolmaster, published an alphabetical list of more than eight thousand words in 1582. Mulcaster aimed to gather "so manie" words "as maie easilie direct our generall writing, * * * bycause theie be the verie most of those words which we commonly use."

In their application of the principle of social usage, specialists in the field of spelling, like curriculum-makers generally, have not come to an agreement as to whether the activities of adults, the activities of children, or some combination of the two, should be used in selecting the spelling vocabulary. Comparison of the writing vocabulary of children with that of adults has shown a 40 percent disparity. Shall recognition be given to childhood words not found in studies of adult writing? Horn (272) has answered this question in the negative. He opposes the use of "temporary" values in curriculum-making, proceeding entirely on the basis of permanent values.

Breed (243), after presenting quantitative data relating to the problem, has argued for the inclusion of words used frequently by children, even though these words are not found in the compilations from adult discourse. The problem, a phase of the old clash between individual and social interests, will quite clearly remain in the realm of controversy until some one determines experimentally which method is educationally most fruitful.

Studies of children's letters—Following the lead of French (262), who tabulated the words in about 1,700 children's letters that had passed through the mail, Cox (254), Hoffman (270), Riddle (296), and Simpson (301) have completed investigations of the child-letter vocabulary. They reported comparisons of the lists of words thus derived with lists from children's themes and adult writing. The authors recognize that the results of these comparisons should be regarded as tentative on account of the relatively small number of running words represented in their studies (Cox, 32,007; Simpson, 67,143).

These investigations of children's letters constitute a promising approach to the problem of determining the writing vocabulary of children. They will be valuable in both the selection and gradation of spelling lists, since the authors have recorded frequency of usage by grades, thus supplying essential data not yet provided in a single published childhood-vocabulary study.

Studies of children's themes—The vocabulary of children's themes is being investigated anew with a view of supplying the type of frequency data just mentioned for a modern theme list with proper geographic distribution. Wilson's (316) study was the first to be completed in a series of five related studies, four of which are still in progress. She dealt with the vocabulary of second-, third-, and fourth-grade pupils in the Middle West.

Symonds and Lee (307) touched on the spelling-vocabulary problem in a series of studies in the learning of English expression. They reported that up to the fifth grade children do their writing almost entirely within the first 1,000 words of the *Thorndike List*, and recommended that language instruction concentrate on the second 500 words of this list in grades IV to VI. These findings might be more firmly established if a larger number of words were tabulated (the total was 6,328) and a writing instead of a reading vocabulary was used as a basis of comparison.

Association method of deriving a vocabulary—With the appearance of a study by Dolch (256), a new note has been struck in vocabulary-building technic. Believing that the composition method of deriving the writing vocabulary has limited possibilities because of the restrictive influence of topics, Dolch followed a suggestion made by Buckingham and employed the free-association method. Pupils in grades II to VIII were given fifteen minutes to write freely the words that came to mind. From 16,206 children 2,312,000 running words and 12,622 different words were obtained. A final list of 9,583 words was selected and graded. The study was subsidized by a publishing house. To the knowledge of the writer, the list has not been

published. It is a contribution to the demand for a graded list with which to check the vocabulary of textbooks and courses of study.

Shambaugh and Shambaugh (299, 300) attempted to develop a "core vocabulary" by the controlled-association method. They collected the responses of 1,851 pupils to 400 selected stimulus words, from which they obtained 4,515 different words. The published vocabulary consists of 1,309 words common to all grades from IV to VIII, inclusive. Horn (274) has pointed out certain objections to this list as a core vocabulary. He called attention to the fact that both the number of pupils and the number of running words were small, that much depended on the particular stimulus words chosen, and that certain types of words such as pronouns and connectives were likely not to appear with proper frequency. Moreover, he added, comparisons show that many words of leading child and adult lists do not appear in the Shambaugh list.

Disagreement among vocabularies of texts—In an article by Selke (297) one finds interesting data on the extent to which the vocabularies of ten modern spellers agree in word selection and gradation. Selke found 8,427 different words in the ten texts, and 1,080 words that appeared in all ten. Considering the various degrees of comprehensiveness, precision, and critical judgment with which the data of original vocabulary studies may be used, the differences among the lists of these studies, and the different theories regarding the recognition of different types of source material, one need not be surprised that the common element in the ten books was no more than 13 percent. The common element in the lists of two vocabulary investigations sometimes falls below 50 percent.

Farrar (259) has made a study of geographic influence on the personal-letter vocabulary, and found it responsible to only a slight degree for differences among vocabularies.

Law of diminishing utility in vocabulary—The review of investigations relating to the selection of the spelling vocabulary may be brought to a close with a discovery of interest to educational statisticians, reported by Condon (253) of the Bell Telephone Laboratories, New York City. "Suppose one takes a large representative sample of written English, counts the number of times each word appears, and arranges the words in order of decreasing frequency of occurrence. The n th word in such a list will then occur with an observed frequency which is a function of n , call it $f(n)$." The law suggested, he believes, is "a quantitative law of diminishing utility in vocabulary."

The gradation of words—Most studies of the gradation of words in spelling, like Selke's (297), have dealt with the content of texts. Selke reported that only three words in the ten texts previously mentioned were located in the same grade, but that two-thirds of the words common to all ten were placed in two or three successive grades. Breed (245) suggested the need for determining the principle or principles to be used in grading the spelling list, discussed the relative merits of four principles, showed the possi-

bility of objectively applying each, and recommended gradation on the basis of the word usage of children. Gradings of the same words by the different principles referred to showed identical placement of from 27.3 to 31.8 percent of the words. It was evident that difference in gradation resulted, in no small degree, from difference in the principles used.

Methods of Instruction

Relation between reading and spelling—A better understanding of the nature of spelling ability should have a direct influence on methods of instruction. Howard (277) has added a contribution to the list of studies designed to show the relationships between spelling and other abilities. She found reading ability and spelling ability more closely correlated than any other pair studied, the coefficients being .70 at the primary level and .59 at the intermediate level. The corresponding coefficients for intelligence and spelling were only .44 and .43. The author concluded that if the child were taught right habits of perceiving words in the beginning stages of reading, some of the problems of spelling as well as of reading would be solved. Sister Mary of the Visitation (287) made an experimental study of the process of visual perception in reading and spelling by means of carefully constructed tests. The problem was similar to that of Gates (265) in an earlier investigation. The results also were similar, except in regard to the presence of a group or general factor. Both concluded that the material of which a perception test is composed is of more significance than the form of the test, and that ability to discriminate details in actual words is the most potent factor in learning to spell. This notion is consonant with a theory previously proposed by Thorndike in an introduction to a paper by Carmen (251). The conclusion is remindful of the interference between modern methods of instruction in spelling and beginning reading, and suggests the postponement of spelling instruction until young readers are ready for word analysis.

Efficiency of the test-study method—The efficiency of the test-study method continues to be a subject of investigation. Senour (298) studied the degree of mastery attained under this method. He found the pupils short of 100 percent mastery, but still "very good." After lapses of one month and four months following instruction, the percentages of retention were 94 and 92, respectively. No control group was used, nor was any other standard presented for interpreting the percentages of achievement. Steinberg (303) compared class and individual instruction in two well-organized parallel groups. The individual method proved superior in three out of four cases, but the differences were slight. Retention was found to be "far better" under the individual method. These experiments tend somewhat to strengthen the view, based on earlier studies of the problem, that the test-study method is superior to the study-test method.

Persistence of the initial error—Attention may now be turned to investigations that relate to less general phases of spelling instruction. Ashbaugh

(238) investigated the persistence of the initial error, a question of vital importance in the pretest technic. His conclusions were based on the records of forty-eight fourth-grade pupils during four consecutive weeks. Of a total of 519 words misspelled in Monday pretests, there were 28 misspelled identically in the Friday tests, and three times as many misspelled non-identically. One in twenty of the initial misspellings was repeated, or persisted. More recently Madden (284) studied the same problem with 110 fifth-grade pupils in the University of Chicago Elementary School and 482 pupils in grades III to VI in the Budlong School, Chicago. Of the 5,887 words misspelled in the pretest, 389, or approximately one in fifteen, were identically misspelled in the retention test, while 1,043, or about one in six, were non-identically misspelled. A misspelled pretest word was therefore about three times as likely to be misspelled differently as identically in the retention test, a finding very similar to Ashbaugh's. It should be observed that even this degree of repetition of the initial error could not be attributed entirely to persistence. In fact, if each word were assumed to have only four possible misspellings, each equally likely to occur, all of it could be attributed to chance. Finally, there is the correlative matter of the persistence of correct spellings. Of the 16,889 words correctly spelled on the pretest, 465, or 2.7 percent, were incorrectly spelled on the retention test. In other words, the initial error is about 2.5 times as likely to be repeated identically as a correctly spelled word is likely to be later misspelled.

The value of phonics—The value of phonics in spelling instruction was investigated by Bugbee (250) in the second and third grades. She found that pupils who had been trained in phonics excelled in spelling phonetic words and that those who had no training in phonics excelled in spelling unphonetic words. This conclusion recalls an earlier study by Gates and Chase (264), in which they found that deaf children, grade for grade, were decidedly superior to normal children in spelling ability, and concluded that the difference was due to the difference in the basis of learning—the child who can hear depends too much on phonetic translation. These studies indicate once more the importance of the visual sense and the doubtful value of phonetic training for the learner of spelling in a language as unphonetic as English.

Pronunciation and spelling—By testing the ability of pupils to spell and pronounce certain commonly misspelled words, following these tests with training on pronunciation of the words, and testing again, Kay (279) showed clearly that improvement in pronunciation itself brings about improvement in spelling.

Concomitant teaching of reading and spelling—Martin (285) experimented with a method of teaching beginning reading that aimed to train pupils in word recognition by having them trace and vocalize words. A "fair second-grade average" in handwriting and considerable skill in spelling were acquired concomitantly. This experiment is reminiscent of the more elaborate experiments of Lay (283) and Fuchs and Haggemüller

(263), in which copying words turned out to be the most effective learning procedure in spelling which they investigated. It also brings to mind Thorndike's (309) suggestion that pupils be trained to perceive words during reading in a way beneficial to later spelling.

Hard spots in words—Another special problem has been studied by Tireman (310), namely, the value of stressing points of unusual difficulty in words. "After a study of over 4,000 pupils in grades four, six, and eight, involving a half million spellings, one is impressed with the consistency with which the data show that marking hard spots is of little or no value" (310:47). In view of the care with which the experiment was performed, one can accept the conclusion as applying to the marking of so-called hard spots in a list of words, when nothing more is done than to explain to the pupils the meaning of the marks. It cannot be said to apply to numerous other methods of emphasizing difficult parts of words in the course of the teaching.

Dictionary training—Since modern scientifically constructed minimal lists include no more than 98 to 99 percent of the words in everyday written discourse, it is evident that about one word in a hundred will have to be learned outside of formal channels. Incidental learning will care for some of this deficiency. For the rest, the dictionary seems to be the best recourse. Dolch (257) has presented data on the use of the dictionary based on the replies of about five hundred superintendents. Sixty-two and a half percent of these superintendents were of the opinion that dictionary training should begin as early as the fourth grade, and more of them reported a 100 percent provision of dictionaries in the fourth-, fifth-, and sixth-grades than all other percentages combined.

Vacation loss—A new and careful study of summer vacation loss was made by Sister M. Irmina (286). A reliable and persistent loss was found throughout the grades in spelling as in arithmetical computation. In contrast, reading ability showed no appreciable change, and arithmetical reasoning actual improvement. In general the author concluded that reviewing at the beginning of the school year is overdone, for her results indicated "that classes as a whole are not seriously handicapped in any subject on account of vacation effects" (286:94).

Courses offered to teachers—McCowen (289) presented the results of a questionnaire study of the spelling-methods courses offered in a selected group of teachers' colleges. Data were provided on the content of the courses and the texts and references used.

Generalization of Ability

The generalization of training in spelling belongs logically under the preceding heading, and is given separate treatment only because of the number of investigations devoted to it.

Perplexities confronting rational methods—Horn (273) clearly precipitated the problem confronting the advocates of generalizing meth-

ods by showing, through careful analysis, the number of different ways in which words can be represented by elements of the English alphabet. For example, he showed that the word *circumference* can be represented in 396,900,000 different ways. The data, he believes, help to explain why chief dependence should be placed on learning each word as an individual problem. There is a possible opportunity for rationalization of learning, he thinks, if one confines oneself to methods of forming derivations by adding prefixes and suffixes, limits himself further to forms that frequently occur in the minimal list and selects rules that have few exceptions. Four such rules were suggested. Their value must finally be determined by classroom experimentation.

Results from the use of rules—Previous studies of the value of rules have in the main been negative. Archer (236) has made a recent study to determine the value of a single rule: When a word ends in an accented syllable whose final letter is a consonant preceded by a vowel, the final consonant should be doubled when a suffix is added. He organized two experimental and two control classes and found a significant difference in favor of the use of the rule. Conclusions regarding the efficiency of this rule should be made in the light of the fact that the results were based on a single week's work.

Masters (288) investigated the efficiency of four spelling rules presented in the 1926 edition of the Horn-Ashbaugh speller. He used the 268 most difficult words in the first 5,000 of Horn's 10,000-word list. The four rules applied to the spelling of 51 of the 268 words. When misspellings of these 51 words were tabulated, it was found that the rules properly applied would have entirely corrected less than a fourth of them, or, in other words, perfect application of the four rules would have improved the spelling of the 268 words about 5 percent. Is it not probable that the time required to learn and later unlearn these rules would be more than enough, if spent in properly directed study, to lift the percentage of achievement as much as 5 percent on the list of 268?

Convinced of the importance of spelling rules, Trowbridge (311) made a study of their value to high-school pupils. She tested the ability of a fourth-year group to apply eleven rules, then had the same rules taught to second- and third-year pupils. When the latter surpassed the senior group in the tests that followed instructions, she concluded that high-school pupils can be taught to apply spelling rules. Even if this were proved in the experiment (and it is generally conceded), the question is: Does the use of rules contribute anything that cannot be better obtained by other means?

Transfer of training—Another problem relating to the generalization of ability is that of the transfer of training. Archer (235, 237) in a carefully organized experiment investigated the effect of teaching primitive forms upon the spelling of derivatives, and *vice versa*. Simple suffixes were used, such as *s*, *ed*, and *ing*. Contrary to previous investigations, he found as much improvement on the transfer forms as upon the study forms. Control groups

were used and critical ratios were computed. Archer's findings are closely related to an important problem in curriculum-making: Shall the minimal spelling list be composed of base forms only, or of base forms and also derivatives? In view of the conflicting results of the experiments, further evidence is needed to reach a final decision.

Difference between bright and dull pupils in generalization—In a carefully conducted experiment, Carroll (252) showed quite clearly that bright and dull children differ in their ability to generalize in spelling, as judged by their power of phonetic generalization in the spelling of words new to them. The difference was indicated by the fact that 69.2 percent of the misspellings of the bright pupils and only 42.6 percent of the misspellings of the dull were phonetic. This conclusion differs from Archer's (237) on the relation between intelligence and transfer in spelling. On the basis of his results, Carroll argued for a type of differentiation in the instruction of bright and dull pupils, in accordance with which the former will give more attention to generalization and the latter more attention to the letter and syllable structure of words.

Diagnosis and Treatment of Disability

Another problem of growing interest in spelling as in other subjects is the diagnostic and remedial treatment of special disabilities.

Most prominent spelling errors—Mendenhall (290) analyzed the errors found in 280,000 spellings obtained from about 100 children at each grade level. Of special interest are his conclusions that the most prominent errors are omission and substitution of letters, that the most frequent error in a word includes, on the average, about 32 percent of all the errors, and that the vowels *a*, *e*, *i*, and *u* give rise to special difficulty.

Types of error and their causes—Book and Harter (240) classified 18,840 spelling errors found in 5,196 test papers in an endeavor to discover causes of the errors and methods of prevention. One can hardly agree with the authors that "Few studies have been published which deal in any way with the mistakes in spelling that are normally made by learners in this subject" (240:106). In fact, after the manner of several previous workers, Book and Harter attempted to determine the causes of errors by a mere analysis of written test papers and compositions. They listed eighteen types of error among which were carelessness, forgetting the word, mispronunciation, ignorance of the word, and incorrect perception. Such error categories are very different in kind from omission, transposition, wrong doubling, and the like, and cannot ordinarily be correctly determined without a supplemental study of individual pupils. In like manner preventive measures for any of these defects should not be proposed on the basis of general psychological principles, but on the basis of detailed experimentation.

In another study, Book (241) clearly showed the possibilities of success when one makes a detailed study of the individual pupil. The greatest difficulty of a twelve-year-old boy showing marked disability was found in his

method of phonetic spelling and his accumulation of erroneous spellings built upon this basis. Book outlined a method of training which brought the boy to the point where he was able to spell correctly forty-eight out of fifty words selected at random from the *Ayres-Buckingham List* of words for the sixth grade.

Speer (302) analyzed the errors made on 104 words by 300 pupils in an effort to discover the causes of the errors. Using the error classifications of previous investigators, she concluded that the most prolific causes were lapses, analogies, mispronunciations, and obscure vowels. The same criticism applies to this study that applies to that of Book and Harter.

Use of the case-study method—In an investigation of spelling disability, Iles (278) adopted the case-study procedure used by Floyd (260). Cases of disability were identified by standard tests and spelling scales, and were studied with a view to determining both the types of error and their particular causes in each individual. Iles's results largely confirm those of Floyd, who reported the following distribution of major causes among her twenty-six cases: defective vision, 2; defective hearing, 1; speech defect, 1; inferior learning capacity, 5; poor observation, 3; poor visual memory, 2; poor auditory memory, 2; immaturity, 2; lack of interest, 4; lack of acquaintance with the English language, 1; writing difficulty, 2; lack of training, 1. Working on the removal of causes, Floyd was able, in five weeks of remedial instruction, to effect an improvement of from one to three years of spelling age in some of these cases.

Specific abilities of good and poor spellers—Palmer (293) investigated the specific abilities of good spellers and found that they excelled in phonetic ability, visual perception, and associative learning. McGovney (291) found that poor spellers possessing superior general ability were below standard in handwriting, in supplying the phonetic equivalents of letters, in perceiving small differences between words, and in remembering visual symbols.

Photographic records of eye-movements—The work of Abernethy (234) is suggestive of the possibilities of photographic records of eye-movements in the diagnosis of problem cases. An analysis of such records of study activities showed that adults tended to study by syllables, but made a detailed scrutiny of especially difficult parts of words. Both adults and brighter children made repeated surveys of the word, with repressions occurring primarily at difficult points. Words such as *hydroxycymene* and *metacleptodropsis* were sufficiently novel and difficult for the adult subjects, who, one might infer from their academic standing, were rather competent spellers. This experiment brings up again the question of "hard spots" in words, and leads one to inquire whether the study procedure of the bright pupils and trained adults in this experiment may be considered as suggestive of an effective method. The reviewer suspects that it may be.

Diagnostic and remedial methods in the classroom—Otto (292) and Guiler (268), using independently forms of the pretest method, showed

the results obtained when the spelling difficulties of individual pupils were identified in advance and later study was focused upon these difficulties. The results in either case are difficult to interpret. A class of twenty-one pupils in Guiler's experiment made an average improvement of 38.2 per cent. This amount of gain has been achieved under a different method in a monthly test on an assignment of twenty words per week.

Law of repetition attacked—Of interest in remedial work is a rather revolutionary proposal of Dunlap (258), who not only questioned the generally accepted law of frequency in habit formation, but proposed the postulate that response, in itself, has *no* effect on the future probability of the stimulus pattern's producing the same response. In fact, he suggested that repetition may be used to abolish a habit already formed, and cited an experiment of his own to prove it. Holsopple and Vanouse (271) conducted a more extensive experiment to test Dunlap's hypothesis. Persistent spelling errors of pupils were identified, and these identical errors were consciously practiced after the pupils had been informed that they were consistently making them. No errors were found in tests after such practice, but practice of the usual corrective type was followed by many errors. These results have suggestive value for the remedial treatment of pupils who have become "hardened" in certain definite forms of misspelling.

Supervision of spelling instruction—Breed (242) described a type of remedial supervision of spelling instruction based on survey experience in two cities. After testing, a large number of spelling lessons was analyzed from the standpoint of pupil and teacher activities, and the outstanding instructional errors were pointed out on the basis of the results of scientific investigations.

Measurement of Achievement

Investigations of new-type tests—During the period under review there has been considerable interest in measurement, especially in new types of spelling tests. Pintner, Rinsland, and Zubin (294) undertook to evaluate a type of error-identification test used by Otis, and a modification of a multiple-choice test used by Gates.

Sample of the first:

Which of the five words is wrongly spelled?

1. the 2. when 3. wil 4. same 5. and

Sample of the second:

The boy played ——— in the yard.

1. bol 2. bat 3. boll 4. ball 5. baul

The reliability of each test was found to be .84; the validity of the first was .69; that of the second, .74.

Foran (261) listed ten different kinds of spelling tests, six of which he studied with respect to difficulty and interrelation. The principal new-type tests among these were the multiple-choice, error-identification, and error-

identification-and-correction. In grades VI, VII and VIII the average correlations between these three tests and pure column tests on the same words were, respectively: .69, .69, and .74. With the column test accompanied by illustrative sentences for the words, the correlations were .76, .73, and .77, respectively. If the column test with illustrative sentences be used as a criterion, the second set of correlations may be interpreted as validity coefficients. Foran concluded that the multiple-choice test is the least satisfactory and the column test with illustrative sentences the most.

An article by Guiler (267) provided a report of a study made to ascertain the comparative validity of three new types of tests: (a) oral-recall, (b) written-recall, and (c) multiple-choice. He regarded that test as most valid that surpassed the others in detecting words not learned to the point of mastery. This conclusion means virtually that that test is best in which the child misspells the most words. The criterion is questionable, inasmuch as one test may be inherently more suggestive of incorrect spelling, or less suggestive of correct spelling, than another. According to this criterion, the written-recall test was found superior to the oral-recall in four of six comparisons, and each of these was superior to the multiple-choice test in every instance. Guiler's results on the multiple-choice test are consistent with Foran's.

Using the column (oral-recall) test as a criterion, Breed (246) investigated the validity of the error-correction (written-recall) test and the multiple-choice test by the correlation method. The following sample items indicate the exact nature of these two tests:

1. Error-correction:
We had a review in (addision) ———.
2. Multiple-choice:
Kream cream creem creme

In the first test the pupil was directed to write correctly the word misspelled in parentheses; in the second he was asked to underline the correct spelling. Validity coefficients were computed in four different experiments, conducted by different experimenters, involving different lists of words used at different grade levels. The average coefficient of validity was .94 for the error-correction test, and .80 for the multiple-choice test. According to these results, the error-correction test is more valid than most standardized tests. Moreover, inasmuch as the reliability coefficient for the column test was found to be .94, one may conclude that the error-correction test is at least as valid as the column test, for a test's validity cannot exceed its reliability. After discussing numerous advantages of the error-correction test and considering possible disadvantages, Breed recommended it for use in standardized batteries and other testing.

Spelling standards and the minimal list—A study conducted by Thompson (308) dealt with the effectiveness of modern spelling instruction and raised a question regarding the standards for judgment. In grades II to VIII, inclusive, he found the median percentage of correct spelling to be ninety in

a retention test administered five weeks after an initial test, and a median percentage of eighty-six six months after the initial test. Thompson thereupon concluded that the minimal spelling list should undergo further reduction to 2,000 words. This conclusion seems questionable in the light of the results obtained by Breed (247, 248) in connection with the standardization of a series of mastery tests based on the work of pupils in nine different states. The median percentage of correct spelling at the end of the semester in grades II to VIII was found to be ninety-one, but it is significant that the pupils in the highest third of these grades averaged ninety-nine, and those in the lowest third only seventy-one. Evidently some form of differentiation of the curriculum is advisable, either in number of words or standards of achievement, rather than a general reduction in the number of words. Moreover, it is not clear that an average grade achievement of ninety-one on a list of 3,500-4,000 words indicates the advisability of such a reduction. One who so concludes is probably too much under the spell of perfectionism in spelling standards.

A phonetic spelling scale—Wallin and Coles (312) constructed a phonetic spelling scale for the measurement of inherent or potential spelling ability. The words, all phonetic, were objectively evaluated in difficulty. Grade norms were not established. The scale is intended to be prognostic and predictive. While it is true that the ability to spell phonetic words may be indicative of power to rationalize and thus be predictive of later achievement on phonetic words, it may not be indicative of ability to master irrational elements—a most vital factor in general ability to spell. More reliable, it seems, would be a measuring instrument that determines ability to master both the rational and the irrational elements in English orthography, unless these two abilities are closely correlated.

Short method of evaluating the difficulty of words—Feeling a need for a larger body of well-selected and accurately evaluated curricular content, Buckingham (249), using spelling words as his material, devised a short method by which data of known difficulty may be employed to find the difficulty of additional data.

Validity of standard tests—The reputation of the *Stanford Achievement Test* depends in large measure upon its reliability. Wilson (314), after making comparisons with scientific vocabulary lists, reported that the spelling test in this battery is definitely and needlessly lacking in curricular validity. In a similar study Wilson and Parsons (315) concluded that a spelling test used in a nation-wide survey was seriously defective from the standpoint of both curriculum and methods.

Determining words unfamiliar to pupils—Washburne and Morphett (313) studied experimentally a simple technic for determining the familiarity of pupils with the words in their spelling assignments, namely, having them check unfamiliar words. There was an average agreement of 81 percent between the results of the children's checking and the results of an objective test on the meaning of the words.

Distad and Davis (255) provided good evidence in support of their conclusion that pupils become better acquainted with the meanings of words through sentence-dictation than through column-dictation tests.

Pupil participation in scoring test papers—In a study of pupil participation in scoring spelling papers Bayles (239) found that a group of sixth-grade children had a scoring accuracy of 98.4 to 99.3 percent, justifying, she concluded, their participation. Now some one should settle the question regarding similar participation on the part of third-, fourth-, and fifth-grade children.

HANDWRITING

Among objective studies of handwriting, most interest has centered in problems relating to manuscript writing, a type of writing that began to make headway in England in 1913 when Edward Johnstone, an illuminator, aroused interest in it. It was brought to the United States in 1921 (321). It is in effect a return to the Italian cursive handwriting of the fifteenth century (322). It aims at greater legibility and beauty, largely by doing away with the joinings of letters (322).

Investigations of manuscript writing—Gates and Brown (320) concluded on the basis of experimental results that cursive writing holds nearly even with manuscript writing in legibility and seems clearly to be a more rapid form for grades IV to VI. Manuscript writing is learned a little more rapidly during the first half-year of training. Gray (321), using motion-picture films in his analysis, found greater increase in rate with age for cursive writing, even though there was "apparently" no loss of time in lifting the pen in manuscript writing. Turner (327) reported superior results both in legibility and rate for manuscript writing. Conard and Offerman (318), studying adults, concluded that they acquired manuscript writing "easily and quickly," and that children should acquire it even more rapidly. Freeman (319), commenting on the results of the photographic study of the two types, stated that the manuscript style leads to emphasis on letter forms, while the cursive leads to fluency and ease.

Discussion of the experimental studies—The experimental evidence is somewhat conflicting. It seems, on the whole, to indicate that manuscript writing is the more legible; cursive, the more rapid. Where should the emphasis be in modern life? On the legibility required in the manuscripts of the fifteenth century or on the producibility developed in business life since then? In the evaluation of styles of handwriting the interests of the reader have tended to dominate, in spite of the fact that it requires about ten times as long to write a letter as to read it. The origin of manuscript writing and its spread, without proof of the advantages claimed for it, suggest that, as in the case of vertical writing, education is entangled with another of its periodic fads.

Diagnostic and remedial work—By diagnosing difficulties and individualizing practice for each element of quality, Guiler (323) showed the

marked improvement in handwriting that may be obtained in a period of only twelve weeks.

Miscellaneous studies—Prewit and Manuel (325) provided experimental evidence of improvement in handwriting resulting from the employment of a supervisor of the subject. Newland (324) studied the relative legibility of written Arabic numerals, and pointed out elements of form that contribute to illegibility. The results of Wittler (328) suggest that intelligence is more closely related to rate than to quality of handwriting, and is more closely related to either than is anatomic age.

Shepherd (326) showed that difference in the quality of handwriting of compositions was responsible for a difference of ten points in the scores of compositions measured by the *Harvard-Newton Scale*.

Using samples collected from twenty schools, Conard (317) developed a scale for measuring various qualities of manuscript writing in grades I to VI.

SOCIAL STUDIES

Investigations of the social studies in the elementary school have not been numerous.

A fusion course—Rugg (336) has published a "reading book" in social science for the seventh grade, based on extensive research through several years. It is significant for both elementary and secondary schools, because it is the outstanding attempt at a unification of history, civics, and geography in this field. Emphasis is placed on economic, social, and cultural ways of living, rather than on the militaristic and political aspects of life. The course will be regarded with skepticism by specialists in geography and those who emphasize the importance of political activities.

Social utility and civics texts—Mahan (333) produced evidence to show that students' concepts of the characteristics of good citizenship do not conform with those of representative adult citizens, and that existing civics texts do not meet present needs as indicated by data obtained from these citizens.

The activity curriculum—In a comparison of an activity course with a more formal textbook course, Bamesberger (330) found no significant difference in the amounts of information acquired by pupils; but stated that the new course was superior from the standpoint of the number of books read, interests observed, and construction activities reported.

Historical content of primary readers—Dawson (332) studied the historical content of recent primary readers. The first readers examined contained little or no historical material. In the third readers 6.8 percent of the total space was devoted to such material, which was more than three times as much as in second readers.

The civics vocabulary—By analysis of textbooks Stephenson (339) derived a technical vocabulary of civics. The words are presented in the order of descending frequency.

Retention of historical knowledge—What are the factors determining retention of historical knowledge? Bassett (331) reported that the combination of interest and effort was the most important of the factors studied. The highest multiple correlation was yielded by interest and effort, mental age, subject preference, and scores on the *Pressey-Richards Test*.

Exercises in history texts—Nudelman (335) listed thirty kinds of exercises found in history texts. The question-and-answer type was the most common. In line with recent trends, exercises in texts are becoming more concrete, offer the pupil greater opportunity for self-expression, and feature reasoning as well as the acquisition of facts.

Best place for questions in a text—Washburne (340) raised a question regarding the value of questions in social-science material and the effect of different locations on their value. According to his results, the use of questions makes a decided difference in learning, and better results were obtained from placing them at the beginning of a unit than from interspersing or from placing at the end. Textbook writers may well ponder this finding.

Miscellaneous studies—Simpson (338) found that training pupils in outlining was more effective in their study of history than training them in answering questions, evaluating, or summarizing.

In an experiment covering fourteen weeks and including two sixth-grade sections of thirty-six pupils each, Willard (341) compared the daily-recitation and modified-Dalton plans of teaching history. In both a content and a problem test the Dalton plan yielded the better results. Additional data should be gathered on this problem.

In an experiment conducted by Mehnert (334), fourth-grade children of both high and low intelligence gained markedly by the use of pictures in history. More was remembered from illustrated oral instruction than from illustrated reading.

CHARACTER EDUCATION

On the basis of questionnaire returns, Fishback (348) showed that seventeen states definitely require character training in the schools. In many states where there is no requirement, large cities provide such training.

Positive results from intelligent training—May gives encouragement to this movement when, in a discussion of scientific studies, he states that "The major implication of these contributions of science is that character can be taught" (353:582). This statement is nowhere more clearly demonstrated than in the work of Healy, Bronner, Baylor, and Murphy (351). By careful diagnosis and foster-home treatment of serious behavior disorders they were able to effect cures in 90 percent of the cases having normal mentality.

Investigations relating to the curriculum—The curriculum-maker in character education may well take note of the "startling amount of disagreement among teachers concerning what is right and what is wrong," reported by Jones (352), but he will probably not be alarmed. The curriculum will evidently feature those traits and trait actions on which there is fairly general agreement.

The moral state of children at different levels continues to be as absorbing as it is important. Rugg, Krueger, and Sondergaard (355) inferred the traits of kindergarten children from objective records of their conversations. Self-assertion claimed 40.8 percent of the remarks and social consciousness 3.7 percent. Such data should have a bearing on both the content and methods of future courses.

Carmichael (344) gathered from others descriptions of behavior situations faced by children between the ages of six and seven. While his method was subject to inaccuracies, his classified list of moral issues should be suggestive for curriculum construction in the first grade. In other contributions Carmichael threw light on the power of moral discrimination (346) and on the causes of lying (345) in first-grade children.

Baker, Decker, and Hill (342) studied a group of eighty-four boys convicted of theft in comparison with a control group matched in age, grade, nationality, and neighborhood. The factors that showed marked difference in favor of the control group were good character traits in parents, physical condition of homes, supervision by parents not both employed, and school attitudes. This conclusion may be compared with that of Hartshorne and May in regard to dishonest behavior:

It is clear that there are significant differences between the extremely honest and the extremely dishonest in respect to intelligence, home background, and school deportment, and possibly in the matter of race or nationality and sex (350:311).

Case studies in the schools—There are several suggestive reports of school accomplishment in this field. Sufinsky (358) described a number of successful case studies in seventh-year classes, suggesting the seriousness of children's troubles and their need for adjustment. In a bulletin from the schools of Norfolk, Virginia (354), one finds descriptions of twenty diagnostic and remedial case studies, and a list of character traits derived from the suggestions of teachers, pupils, and parents. Additional case studies of behavior difficulties were reported by Seeds and Hillegas (356), together with quantitative data on difficulties in classroom control and in building habits of good citizenship.

Measurement of character traits—There has been considerable activity in the field of character measurement. Brown and Sheldahl (343), in a critical article, distinguished four types of measuring instruments: (a) rating scales, (b) tests of temperament, (c) tests of knowledge, and (d) tests of conduct. To the construction of the fourth, the most important type, Hartshorne and May (350) made an impressive contribution.

By comparing the results on a Hartshorne and May honesty test with honesty ratings made by teachers, Cutright and Shoemaker (347) found as many reliable as unreliable pupils at each letter rating—A, B, C, D, F, indicating again the inaccuracy of the rating method.

Shuttleworth (357) reported the results of an attempt to measure the factors of character and environment, apart from intelligence, involved in scholastic success. An elaborate analysis yielded character and environmental items that gave substantial correlation with scholastic achievement.

GEOGRAPHY

Publications in the subject of geography are devoted largely to content, and the discussions of teaching problems that appear are for the most part subjective in nature. The objective method, however, is making headway, as indicated by the investigations hereinafter referred to.

Studies relating to the curriculum—The catalogs of 137 state teachers colleges show, according to Armentrout and Whitney (360), that four types of geography courses are now being offered in these institutions—regional, social and economic, technical, and professional.

Duboc (362) reported the opinions of 527 teachers and 92 school administrators regarding desirable content in a geography text. Of twenty items in her questionnaire, making content sufficiently easy was favored by the most teachers and the use of pictures without legends by the fewest.

Subjectmatter in elementary geography should be organized in terms of understandings of the geographical personalities of specific regions, that is, in terms of the outstanding adjustments which the inhabitants of these regions make (366).

Mandeville (365) presented experimental data indicating that children are decidedly more interested in geographic readings that describe and explain than in readings that simply describe. They preferred the relationship type of story.

Studies relating to instruction—On the side of methods, Truitt (369) studied experimentally the relative efficiency of individual and class instruction. He concluded that individual instruction is better adapted to "information" geography, than to "problem" geography, and is superior to class instruction in either case in the sixth and seventh grades. Group instruction was more effective in the fifth grade. Robinson (368) showed the advantages of pretests in geography as used in the Cleveland schools. Hoppes (363) studied the picture-reading ability of elementary-school children. She contended that while they quite readily identified cultural and natural items, they gave little evidence of real picture-reading ability, that is, ability to recognize relationships between the two. The effectiveness of the excursion as an instructional device was well shown by Crawford and Grinstead (361). A two-hour excursion yielded markedly better results than a study-work-recitation period of like duration. Ridgley (367)

showed that children have a high degree of spontaneous interest in places. From Lord's study (364) it seems evident that children easily confuse longitude and latitude, and understand the latter better.

NATURAL SCIENCE

What are the results of science instruction in the public schools? Ashbaugh (370) attacked this problem at the eighth-grade level. Using standardized tests, he found that pupils who had studied general science for a year made scores neither better nor worse than pupils who had had no general science. Hurd (375), after investigating the same problem in six different high schools by means of objective tests, reported that pupils made a mean gain per test of 32.1 percent. He concluded that "our boys and girls are really learning something."

The ills of science instruction are frequently attributed to the lack of preparation of teachers. Van de Voort (378) made a detailed study of the teaching of science in normal schools and teachers colleges. She emphasized the need for courses of collegiate rank, courses on the organization of materials and their adaptation to the needs of the learner, and courses offering practice in the teaching of science. In a comparative study, Meier (376) found that natural-science instruction is given much more time and is better developed in German than in American elementary schools, due to the recognition which science has received as a required subject and the thorough preparation of elementary-school teachers.

Materials for science courses—Schools planning a course of study in elementary science may derive detailed help from the report of a national committee of which Ballou (371) was chairman. Perhaps the most valuable portion of this report is a chart suggesting science materials for each level from the kindergarten through the sixth grade. Craig (372) has developed a systematic technic for curriculum-making in this subject. After analyzing several hundred courses of study, he set up three criteria for the selection of objectives, based on the assumption that the central aim is helping children to become intelligent laymen, not scientists or naturalists. Lists of evaluated objectives are presented and their use in constructing a course of study is explained. Valuable in this same connection is the series of studies of children's nature-study questions reported by E. Laurence Palmer and others since 1921. A recent report (374) provides a classification of questions by grades and fields of science.

Methods of teaching—On the side of methods the value of laboratory work is still a subject of debate. Experimental studies indicate that the demonstration method yields better educational results than the laboratory method, and is more economical from the standpoint of time expenditure, current expense, and capital outlay (372). Robertson (377) found that the "guidance-outline" method, though requiring much more work of the teacher, yielded no better results than the "developmental-discussion" method.

CHAPTER IV

Music, Nursery-School and Kindergarten Methods, and Integration of Subjectmatter

MUSIC

TO LIMIT the discussion of music to the pages assigned permits only the consideration of information gathered from two sources: the accounts of experimental studies and the reports of the committees appointed by the Music Supervisors National Association.¹ Although measurement can hardly be considered a method in music, still information gained from the use of standardized tests² is effecting changes in the ways of music instruction. The reports of the national committees, in their turn, are the guide posts erected by the national association to direct the mass of music instructors to more progressive methods.

Differences Among Children

Inequalities in the grouping of pupils—Kwalwasser (387) believes that the motto, "music for every child," should be revised to read "the right kind and amount of music for every child in proportion to his capacity." He made this statement after summarizing the scores on the *Kwalwasser-Ruch Musical Accomplishment Test* received by 417 pupils in grades IV to VIII at Syracuse. Among the significant results was the following: pupils who had private lessons in music scored an average of 123 points, while the average score of pupils who were dependent solely on school instruction was 76. Many evidences of the unfairness of the present grade grouping for music instruction were found; for example, if from the best score in each grade the poorest score was subtracted, the average difference was equal in test scores to eleven years of school achievement.³

Differences in native endowment—The determination of differences in native endowment is essential to the assignment of the kind and amount of musical instruction a child should receive. Seashore's *Measure of Musical Talent* is most commonly used for this purpose (386, 391). McGinnis (394) has found that it may be used with young children if suitable modifications are made "particularly . . . in shortening the records and increas-

¹ To the reader who is unfamiliar with the history of music instruction in the schools of the United States, the two following references are suggested: "Evolution of Public School Music in the United States—A Symposium," *Music Teachers National Association, Proceedings*, 1922, p. 158-93; and "Research in High-School Music," *Sixth Yearbook of Department of Superintendence*, 1928, p. 383-96, which includes an extensive bibliography.

² The reader interested in lists of music tests is referred to citation 388 in the bibliography.
³ Miss Beelar found that fourth-grade children of similar musical ability, grouped for musical instruction, made more progress than did pupils of the undifferentiated group. See, Beelar, Lola Agnes. *An Experimental Study in Music to Determine the Effectiveness of Homogeneous versus Heterogeneous Groupings*. Unpublished masters' thesis, University of Pittsburgh, 1929.

ing the intervals between judgments." McCarthy (392) concluded that it is a better predictive instrument for the extremes of musical ability, while from a study of white and colored children two other investigators decided that the abilities measured by the subtests, pitch and tonal memory, are more affected by training than those measured by intensity and time. They find that white children are superior in these abilities to mulatto children, who are, in turn, superior to the colored children (384), a conclusion quite at variance with the prevailing opinion that the colored race is more musical than the white.

Progression in the songs of children—Nestele (402) insists that there are no thoroughly unmusical children. He compared the spontaneous tunes to which 120 children varying in age from 3 to 15 years sang "My name is . . ." and found the tunes increased in musical complexity with age. He also had these children sing the words of certain verses which varied in difficulty to tunes of their own devising which they thought expressed the ideas. He found that the melody of song stands in close relation to the melody and rhythm of speech. The songs of the small child were syllabic, gradually the melody acquired ligatures, and the pauses or rests only appeared as the child grew older. Among the many recent articles in which creative musical activities of children have been described, Nestele is the only author who has attempted to delineate progression in the songs of children and to analyze the features characteristic of advance in age or achievement.¹

Sight-Singing

Dykema has said there are four doors to music—song, instrument, technical study, and listening. Of these the first and last have greatest prominence in the primary grades, while the other two gain emphasis as the years of the elementary school advance. Singing songs learned from hearing them is the commonest form of musical activity in the kindergarten and primary grades. Until recently the emphasis in the upper grades has been entirely upon sight-singing. The lack of proficiency in this activity after four or six years of practice has changed opinion regarding its importance (388), and McConathy (393) says that "while teachers are still eager to secure good sight-singing, exaggerated emphasis upon it is gradually subsiding."

Sight-singing is taught at Rochester without the use of syllables with better results than were produced by the syllabic method (395). Jacobsen (389, 390) in his study of eye-movements in reading music found that sixth-grade children who sang the words of the song rather than the syllable

¹ Since this chapter went to press, the writer has obtained a report of a most unusual experiment in creative music. The children of the fourth-, fifth-, and sixth-grades of Lincoln School composed a symphony which they publicly performed, after twelve weeks of practice, using many instruments which they themselves had made. See, Coleman, Satis, *A Children's Symphony, with the Themes Composed by Children of the Elementary School, and Played by Them on Instruments of Their Own Making and on Other Simple Instruments*. Teachers College, Columbia University, (In press).

bles made fewer pauses, errors, and regression movements. He found that movable "do" seemed actually harmful, for sixth-grade children often sang the notes correctly but miscalled the syllables (389). Several accounts of introducing sight-reading through rote singing were found, but the authors gave no verification of the value of the method beyond enthusiastic comments.

Standards of Achievement

Certain standards of attainment, arranged by the Research Council and adopted by the Music Supervisors National Conference in 1921, have been used as guides in formulating courses of study in elementary schools and in the preparation of textbooks (400). Only two studies of the validity of these standards were found (380, 388:107-27). The first, a study of 4,177 children in five school systems famous for their superior work in music, was made before 1928, but in the interpretation of the results Kwalwasser (388) has made explicit certain difficulties which are now being consciously attacked by the more progressive music teachers. He concluded that the acquisition of musical knowledge by children is unsteady and irregular; skill of reading from notation is not acquired to any considerable extent; children cannot recognize songs by sight which they know by sound; acquisition of notation knowledge is so slow as to reflect discredit on the present status of music pedagogy; the learning rate expressed in test items is 1.08 for grades I to IV and .52 for grades V to VIII¹; and, finally, the present teaching methods are not sufficiently refined to insure the realization of many of the aims formulated by the Research Council. Burns (380) found that the standards in sight-singing were too difficult for a group of sixth-grade pupils in Medina County, Ohio.

Instrumental Music

Instrumental music is now frequently introduced in the kindergarten and primary grades by way of the rhythm band, the toy orchestra, and the use of bells and glasses of water as musical instruments. Piano instruction has been gaining favor in the schoolroom for the past ten years. A subcommittee of the Music Supervisors National Association has prepared a manual, *A Guide for Conducting Piano Classes in the School*, which includes in addition to aims, principles, organization, and the like, several pages devoted to current practices in many school systems (397). In the study sponsored by the National Bureau for the Advancement of Music, piano instruction in classes is found to be the practice in 250 towns and cities. Classes of fewer than twelve pupils are preferred by the public-school teachers, and proper methods of grading are imperative (401).

One fact which is weighed in the choice of band and orchestral instruments by elementary-school children at Long Beach, California, and

¹ The Kwalwasser-Ruch Tests of Musical Accomplishment were used.

Medina County, Ohio, is the individual's musical rating obtained from batteries of standardized tests (379, 381, 382).

Developing Musical Appreciation

Listening to music and musical appreciation have gained untold facilities through the use of the phonograph and the radio. This form of musical experience, which has long been a part of the program of the kindergarten, has been accepted as an integral part of musical education within the past ten years (396). The literature is rife with articles regarding the importance of listening and methods of developing appreciation. Indeed, so important has this phase of music instruction become that the subcommittee on Music Appreciation of the Music Supervisors National Association presented a detailed report in which music appreciation at the elementary-school level is defined, its several attributes and principles are discussed, and the general and specific aims, the materials, the procedures, and the attainments for each grade are enumerated (398).

Rhythmic Interpretation of Music

Rhythmic interpretation of music takes many forms from stepping in time to a simple march to elaborate bodily movements interpreting the mood of the selection such as are found in the Dalcroze eurhythmics. "There is a constantly increasing number of music educators who are experimenting with rhythmic bands, with the physical expression of rhythm through body movements and dances, and with the development of tonal concepts by direct contact with musical instruments in co-ordination with the singing voice" (396). The rhythm band is most common in kindergarten and primary grades, but in some third and fourth grades the pupils read from scores which they have made under the teacher's guidance. Heinlein (385), after comparing the records of certain pre-school children's rhythmic reactions taken by a mechanical device and the accounts of the same movements made by trained observers, concluded that the true nature of a child's rhythmic responses are often erroneously interpreted by observation alone.

Newer Tendencies

The report of the Research Council at the last meeting of the Music Supervisors National Conference was entitled: *Newer Practices and Tendencies in Music Education*. In the preamble the chairman states that this formidable list of twenty topics, each of which is discussed later in the report by some member of the Council, has been compiled because there are many new or re-emphasized philosophies and practices now having strong influence on the enrichment of the music program (383, 396, 399).

NURSERY SCHOOL AND KINDERGARTEN METHODS

Untrammelled by precedent the nursery school in the United States and Canada has been privileged to evolve methods of instruction which seemed best suited to the children. Since some of the directors have not been satisfied to be guided by opinion in such matters, many nursery schools, especially those maintained by universities, have become veritable research centers in which facts regarding the mental as well as the physical development of the young child are recorded,—his behavior and emotions, his language and problem-solving abilities are observed.

Nursery School Methods

Students of the pre-school child have been fortunate to have a means of announcing at least the summaries of their studies through the *Child Development Abstracts and Bibliography* published each month by the Committee on Child Development of the National Research Council. In addition to these monthly bibliographies, a recent issue of the *Psychological Bulletin* was devoted to studies of child psychology (403), so the present reviewer will waive further obligation by referring to the excellent summaries regarding the mental growth of the pre-school child contained in the *Proceedings of the Third Conference on Research in Child Development* (416), and the briefer résumé of recent studies reported in 1930 by the Association for Childhood Education (415).

Interests and abilities of pre-school children—The need of the continuity of methods and materials from nursery school to kindergarten led Greene (409) to devise a simple test by which teachers might rate children whether entering kindergarten directly from their homes or from the nursery school. A study of the amount of the teacher's time taken by two-year-olds and three-year-olds as well as older children was made at the University of Minnesota, and it was found that more of the teacher-initiated time was required by the youngest children. As they grew older, more pupil-initiated attention was demanded (407).

Smith and Bradbury (424) found that simple stories concerning everyday happenings, characterized by verbal repetition, were enjoyed by two-year-olds and three-year-olds, while simple statements and ideational repetition appealed more as the children grew older. Havens and Andrus (410) found that four-year-olds and five-year-olds liked simple realistic elements in stories. After a year of systematic story-telling 33 percent of the children knew the meaning of 69 percent of the words on a vocabulary list on which 12 percent of them had known but 12.9 percent at the start.

Knauber (413) found that nursery-school children would attempt to draw anything which was new and interesting. The children in the kindergarten, however, were more inclined to draw things for which they had learned patterns. Hildreth tested children's ability to imitate written symbols, and Hertzberg (411) concluded that motor dexterity had little prac-

tical value as a prediction of a kindergarten child's mental age. Polkinghorne (417) at the University of Chicago found that all the kindergarten children tested had some understanding of fractions; one-half was best known, then one-fourth, two-thirds, and three-fourths.

A score card for general appraisal—A score card for the appraisal of the children's achievement, teacher's qualifications, and equipment for nursery schools, kindergartens, and first grades was devised by Reed, while Bain prepared a tentative analysis of teaching at these three levels of the school system (415:34-43).

Kindergarten Methods

Introduction of school subjects—Only one experimental study of the introduction of school subjects into the kindergarten was found. Bird (405) tells that in the Henry Barnard School, Providence, cards on which letters and words were written in a rough substance were placed about the kindergarten room. As the child became interested he was encouraged to trace and later to imitate the writing of the letters or words. Within three weeks some children wrote statements of their own devising on the blackboard. Easy transition was made to printed lettering and reading by use of the typewriter. Progress at the end of the first grade was measured by the median score on *Gates Primary Reading Test* which was fifty-one points in excess of the Gates standard (405).

Tests for use in kindergarten groups—Probst (418) and Sangren (422) have devised tests of general information suited to kindergarten children. The children entering the kindergartens at Cleveland are arranged in fast, average, and slow groups according to their scores on the *Kindergarten Classification Test*. The success of some children at the end of the kindergarten is measured by their scores on the *Kindergarten Achievement Test* which contains minimum essentials in motor co-ordination, manual skill, and English, while others are given a *General Information Test* including subtests on color, number, and form (420, 425).

Vocabulary and language usage—Horn (412), from a diary list of the words used by children in conversation in the kindergarten and at home, and by a record of the words they used when shown pictures, obtained 2,596 words which have been classified in a fashion similar to that used in the Thorndike *Teachers' Word Book*. The language used by twenty-seven kindergarten children in a series of unsuspected observation periods was studied by Rugg, Krueger, and Sondergaard (421). They found that two-fifths of the remarks of the children indicated an interest in their individual selves, while one twenty-fifth showed interest in the affairs of the group.

Readiness for the first grade—Studies of the readiness of kindergarten children for the work of the first grade have been made in reading and in number work. At Los Angeles it was found that a mental age of seventy-six

(six years four months) seemed a safe basis for promotion into the first grade (419). The children with a lower mental rating were given activity work in which an attempt was made to broaden their experiences, to build better concepts, to develop good mental habits, and to enlarge their vocabularies. Children who seemed too immature for first grade were given similar preparatory work for reading in the pre-primary school at Rochester (423). The Research Committee of the California Kindergarten-Primary Association found that mental immaturity and inability to understand and use English were the commonest causes of retardation at the beginning of the first grade (406).

Results of kindergarten training—MacLatchy (415:55-66) found, from the records of 1,123 children entering the first grades at Cincinnati, that when the records of the children who had attended kindergarten were contrasted with those who had not, the scores of the kindergarten children were appreciably better, for 13 percent could count to 100, 70 percent could count twenty objects, and 9 percent knew the sums of ten addition combinations when they were presented in problems. The corresponding percentages for the non-kindergarten group were 5, 48, and 5.

Appraisals of the effects of attendance at kindergarten upon progress in the primary grades were reported by Green (415:21-38), MacLatchy (414), and Goll (408), using mental age, standardized-test scores, and promotion records. Green gave an unequivocal answer in favor of kindergarten training. The results of MacLatchy and Goll were less favorable to the kindergarten. Although few direct studies of kindergarten procedure and methods have been found, still the increasing tendency to appraise kindergarten practices in an objective manner promises well for the future of this important level of the school system.

INTEGRATION OF SUBJECTMATTER

Several terms have been used to express the successive variations of the educational theory now delimited by the term *integration*. "Within a few short years," writes Horn (430), "we have seen in rapidly changing procession sense training, apperception, cycle sequences, problem methods, project methods, purposes, [and] activities."

Changes in Terminology

In the search through the literature of the last three years, one is surprised at the completeness with which the terms *activity* and *activity program* have supplanted *project* and *integration of subjectmatter*. Integration is implicit in every activity, however, for the commonest element in the endless succession of descriptions of activities is the list of "subject-matter interests," "curriculum values," and the like by which the writer justifies the activity. The reader who glances through this bibliography will be surprised to notice among the titles that the word *integrated* appears

once, and *project* once. In the majority of the other titles the word *activity* appears. The only recourse left is to gather information regarding the integration of subjectmatter from data devoted in most cases to quite another purpose, the description or enthusiastic justification of the so-called "progressive school" or the "activity school." There will, of course, be many variables present which may becloud the evidence for integration, but it is the only sort of evidence which seems available.¹

Development of Exact Data

The brevity of the list of references is no index of the amount of effort made in searching for material on this subject. Literally hundreds of descriptions of activities were culled in the search for objective evidence regarding the integration of subjectmatter. Had lists of "learnings" from other subjects been sufficient to satisfy the editor, the bibliography could have gone to any length.

Writing in 1928, Streitz (436) stated that she read seventy-one articles which appeared in the best-known educational magazines during the two years previous, looking for "evidence which would either show considerable scientific work already begun with so-called creative activities, or serve as a starting point for this work which must inevitably follow." She found only two articles which dealt with the "actual recording of experiences in any systematic form," although she found thirty which showed some evidence of the children's work in prose, poetry, art, music, and plays. Her conclusion was: "The activity program is then, scientifically speaking, in the data-gathering stage and not yet in the stage of measurement or precise evaluation."

Appraisal through the Use of Standardized Tests

Among the criteria for selecting the so-called "units of work" listed by the members of the staff of Lincoln School are the following two: "Each unit of work must furnish leads into other related units of work and must stimulate in the child the desire for a continued widening of his interests and understanding. Also, 'each unit . . . must be accompanied by progress in the use of such tool subjects as contribute to that unit'" (432:37-38). Then, since a school is judged by the results of its work, a later chapter is devoted to "Outcomes in Skills, Information, Habits, and Attitudes." Skills are appraised by results in standardized tests, and the record in most instances surpasses the tests norm for the grade in question. The symposium, "The Use of Tests and Measurements in the Three R's," is devoted to the records made by nine of the so-called "progressive schools."

In this symposium, E. R. Smith (435) says: "The results of tests have always shown that pupils trained in a 'progressive' school environment

¹ An unpublished master's thesis at Ohio State University reports on the skill in letter writing acquired by pupils in the University Elementary School. Since this school is organized on an activity program, the study represents one of the first attempts to collect systematic data. See, Duncan, Margaret. *Letter Writing in Elementary Schools: A Comparative Study*. Ohio State University, 1931.

[hold] their own even in the most formal sides of school work." Waddell (437) has found that the test records made by the University Elementary School, of the University of California at Los Angeles, when compared in 1928 with a similar record for a public school in the neighborhood, excelled in every subject but spelling; although the average mental age of the public-school children was three months in advance of that of the University School. First-grade children who learned to read as a part of an integrated activity program organized about a city unit quite surpassed the average scores set by the author of the *Gates Primary Reading Test*: 60 percent of the scores on the first two tests and 64 percent on the third test were above the second-grade average.

The record of nineteen third-grade pupils, of whom all but seven had reached the third-grade norm at the beginning of the year, was given by Porter (433) in her description of the effect of a year's work in units of activity. At the end of the year all but five of the pupils exceeded the norm for the end of the fourth grade on the *Haggerty Reading Test* and only two of these were slightly below the corresponding third-grade norm. Wilson (438) used informal number activities, such as playing store and games, as the preparation for definite drill in the addition and subtraction combinations in grade III with most satisfactory results.

Garbe (429) after remarking that "one cannot write without having something to say," tells of an attempt to correlate the sixth-grade work in grammar and composition with history and geography which was unusually successful when measured by percentage of errors in the last composition as contrasted with the errors in the first. The errors in each composition were marked after the composition had been read to the class. The types of errors were grouped, and the students felt that help to overcome these errors was needed. In a study of three schools in Hawaii the authors concluded that the gains under an "activity program are at least as great as under a formal program" (428, 434).

Appraisals of Other Sorts

Blaine (426) reported a questionnaire study of the use of the project in which 121 satisfactory replies were received. It was shown: (a) the success or failure of the project method will be determined by the success or failure which attends its application; (b) . . . the most important difficulties can be attacked by directing its use to fields outside the constructive type project; (c) . . . the project method would show more and better learning if we were able to measure the associate and concomitant learnings; (d) . . . more adequate preparation of the teachers is needed to combat traditional routine procedure; (e) . . . the highest rank difficulties are in a large measure remediable; (f) . . . the factors of greatest strength for building up a wholesome community interest [are] that this method *deals in life situations* and thus enlists the interest

of the home; and (g) . . . one of the needs most essential to the promotion of a common understanding in method work is a common interpretation of the terms, *project* and *project method*.

Hughes (431) found in reorganizing the Fresno school curriculum to an activity program entitled *Citizenship Studies* that a set of checks was necessary which fell under the three headings: pupil participation, pupil development, and command of subjectmatter. The staff at Lincoln School provided checks in addition to standardized tests. Habits and attitudes were checked by a special report to parents on which the twenty-five most desired traits of character were listed and by certain special checks which indicated the individual child's share in the work. Checks for the outcome of the unit for the class as a whole are also suggested (432).

Waddell (437) concluded that "there seems to be no real difficulty to attain, by activity procedures, the requisite standard of accomplishment of essential knowledge, skills, habits, that are now being attained by formal, traditional schools. Standard tests are available by which this is discoverable." But "the real challenge which the activity procedures present to the experts in educational measurement is that they devise norms, scales, and standards for the measurement of growth of [the] fundamentals of real education. These will have to be qualitative rather than quantitative measures."

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